DOCUMENT RESUME

ED 133 486 08 CE 009 309

TITLE	Career Information for Teacher Preparation in Career Education.
INSTITUTION	Interinstitutional Consortium for Career Education, Salem, Oreg.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.; Oregon State Dept. of Education, Salem.
PUB DATE	Sep 76
GRANT	G007502395; ORE-SEA-24-000-132a
NOTE	113p.; For related documents see CE 009 305-311
EDRS PRICE	MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS	Administrator Education; *Career Education; Cluster Grouping; Course Content; *Curriculum Development; *Fused Curriculum; Higher Education; Integrated Curriculum; Job Skills; Learning Activities; *Occupational Clusters; Occupational Information; *Program Development; Teacher Education; *Teacher Education Curriculum
IDENTIFIERS	Oregon

ABSTRACT

One of seven similar project reports dealing with program development in career education for teacher, counselor, and administrator preparation, this report presents information on infusing career education content into educational personnel preparation programs. The information describes the results of work done by the Career Clusters Task Force, and is grouped under the headings Desired Student Outcomes K-12, Desired Student Outcomes (Teacher Education Students), Desired Student Outcomes (All College and University Students), Teaching/Learning Activities, University Faculty Competencies, Teacher Education Faculty Competencies, Cluster Classification Criteria, Existing Cluster Taxonomies, and Labor Market Information. Appendixes, covering the majority of the document, contain selected occupational clusters, a comparison of cluster taxonomies, and suggested channels for delivering career information. For more information on the total project, see CE 009 305. (TA)

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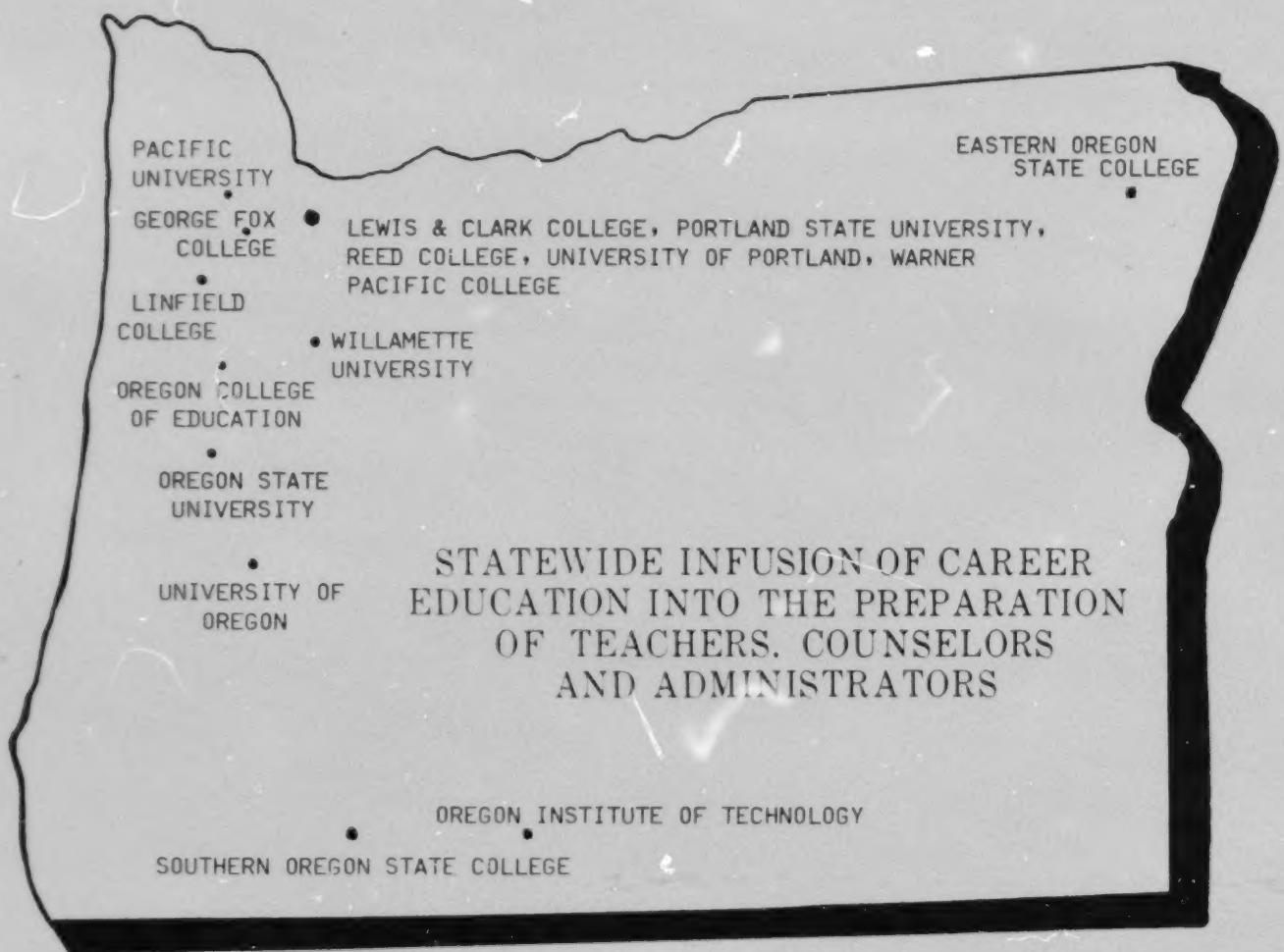
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STATEWIDE INFUSION OF CAREER EDUCATION INTO THE PREPARATION OF TEACHERS, COUNSELORS AND ADMINISTRATORS
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THE INTERINSTITUTIONAL CONSORTIUM FOR CAREER EDUCATION

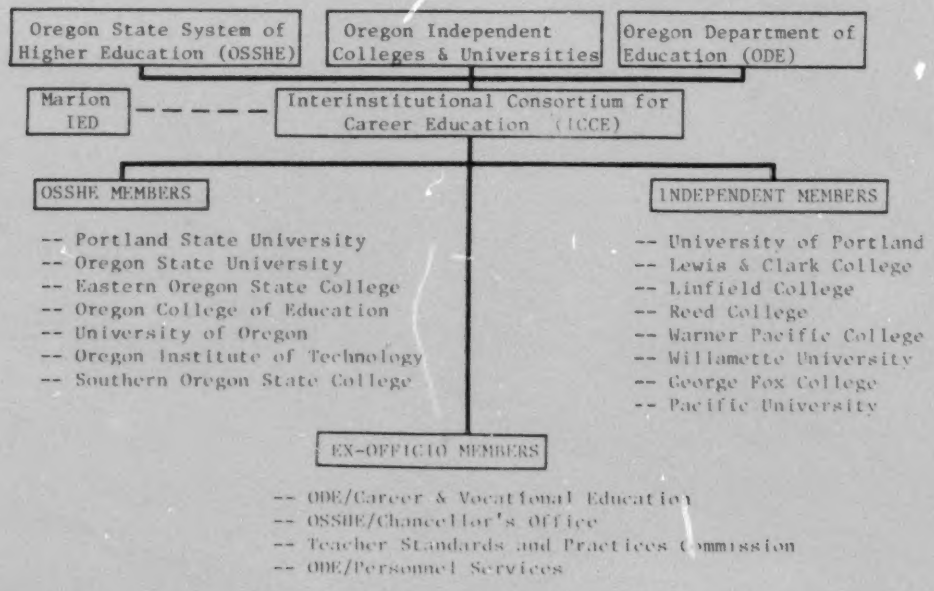
ORGANIZATION

The Interinstitutional Consortium for Career Education (ICCE) was formed in 1971 and is comprised of all Oregon institutions of higher education which prepare teachers, counselors and administrators. The endeavor is cooperatively sponsored by the Oregon Department of Education, the Oregon State System of Higher Education and the independent colleges and universities of Oregon. Staff is employed by the Marion Intermediate Education District (IED) to coordinate Consortium efforts and carry out Project activities.

PURPOSE

- Consortium activities are designed to facilitate Oregon college and university efforts to improve their preparation of educational personnel for roles in career education.
- The ICCE serves as a planning/coordinating body charged to study the needs for personnel development in career education and to promote necessary action to meet those needs.

STRUCTURE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-- Oregon College of Education
-- University of Oregon
-- Oregon Institute of Technology
-- Southern Oregon State College
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-- University of Portland
-- Lewis & Clark College
-- Linfield College
-- Reed College
-- Warner Pacific College
-- Willamette University
-- George Fox College
-- Pacific University
EX-OFFICIO MEMBERS
-- ODE/Career & Vocational Education
-- OSSHE/Chancellor's Office
-- Teacher Standards and Practices Commission
-- ODE/Personnel Services

The project presented herein was conducted
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USOE #G007502395 and
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The activity which is subject of this report was supported in part by the U.S. Office of Education, Department of Health, Education and Welfare and the Oregon Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of either agency. No official U.S. Office of Education or Oregon Department of Education endorsement should be inferred.

PREFACE

The materials presented in this document has been developed through activities of the Interinstitutional Consortium for Career Education and within the jointly supported state and federal project, "Statewide Infusion of Career Education into the Preparation of Teachers, Counselors and Administrators". This comprehensive project is focused upon three essential aspects of preparing educational personnel for expanded and extended roles in career education. Those aspects are: staff development for college and university faculties; program development for teacher, counselor and administrator preparation; and teacher certification and program accreditation.

This document has resulted from work in the program development area and present career clusters content for the preparation of education personnel, developed by the Project's Career Clusters Task Force.

This report is one of eight similar reports dealing with program development in career education for teacher, counselor and administrator preparation. The other reports address Elementary Teacher Education, Secondary Teacher Education, Special Education Personnel, Counselor Education, Vocational Education, Community Resources Utilization and a Conceptual Model for the Career Education Dimension of College and University Personnel Preparation Programs. Although each report is complete in itself, the user of this report may find others supportive in meeting a particular need.

Many individuals and agencies have contributed to the work of the total project. The Program Development aspects, in particular, have required the collaborative support of numerous individuals. Portland State University and Dr. Allen Lee, Director of Career Education, specifically deserve much of the credit for the accomplishment in Program Development. PSU was the major sub-contractor to the ICCE for this work and Dr. Lee provided the leadership and direction for those activities. The original report was prepared on behalf of the Task Force by Kerm Lund and edited by Dr. Lee, both of PSU. Further editing and final formatting was done by the ICCE central office staff. The Task Force members who prepared the original material deserve our sincere appreciation and thanks. They are identified in the appropriate section of this report.

The results of this initial effort to infuse career education concepts into teacher, counselor and administrator training in Oregon are already impacting upon Oregon educational personnel development programs. Further testing, evaluation and course/program infusion will take place during 1976-77 and 1977-78. It is hoped that this and the companion reports will facilitate that effort and also be of assistance to colleges, universities and other agencies and institutions outside Oregon who wish to undertake similar efforts.

Darrell L. Ward, Director
Interinstitutional Consortium
for Career Education

INTRODUCTION

The potential of any educational reform movement is highly dependent on the attitudes, skills, and understandings of the educational personnel responsible for its implementation. As such, the maximum potential for career education can only be reached if its concepts, knowledges and skills are adequately infused into service and preservice preparation of teachers, counselors and administrators. Although many individuals, agencies and institutions have responsibility for personnel development, the institutions which must provide the primary leadership and direction are those colleges and universities which prepare educational personnel for our schools.

The Interinstitutional Consortium for Career Education, established in 1974, seeks to facilitate the efforts of Oregon institutions who prepare teachers, counselors and administrators to better meet the needs of personnel preparation for career education. This fifteen member consortium devised and planned a change strategy for college and university personnel preparation which focuses upon three essential aspects of personnel development : staff development for college and university faculty, program development for college and university preparatory programs, and teacher certification and program accreditation. The work reported in this document represents a portion of that change strategy in the area of program development. Materials included are those developed by a task force and are suggested as appropriate to include in selected courses for educational personnel preparation.

The conceptual deisgn for this activity was that a group of knowledgeable people representing colleges and universities, local education institutions, the Oregon Department of Education, and the business, labor and industrial community would come together within the context of a given area of education, i.e., career information, and identify those concepts, student outcomes, teaching/learning activities, teaching competencies and body of information which would be important for inclusion in the preparation programs for school personnel. This information should also be useful to all college and university faculty in relating their courses to various careers.

The task force chairperson played a key role in organizing the task force and in the development of the report. The chairperson was assisted in each instance by a task force coordinator who had the specific responsibility of pulling together the task forces varied activities and materials and putting them into a cohesive document for review and examination by task force members. The task forces reviewed information from a variety of sources and met periodically to discuss their findings and to suggest what should be included in the career education content of preparatory programs. Before finalizing that task force report a draft prepared by the coordinator was distributed to the task force members for their comments and additional input. Additionally, the Northwest Regional Educational Laboratory was contracted to critique the material and provided an analysis of its content. The Northwest Lab provided sources of additional material

which could strengthen the task force document. Subsequently, much of this material was included in the task force reports.

This report should prove useful to college and universities both in their education preparation programs and in the institutions as a whole. The information from the task force can provide concepts and content to be considered by all faculty members.

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CAREER CLUSTERS INFORMATION
FOR
EDUCATIONAL PERSONNEL PREPARATION PROGRAMS

The material included here is the result of the work done by a Task Force whose purpose was to identify, collect, review and organize a body of career cluster information for consideration by colleges and universities with responsibility for the preparation of educational personnel.

TASK FORCE MEMBERSHIP

Persons from various colleges and universities, local school districts and the Oregon Department of Education served on the Career Clusters Task Force. Their contribution to the project is truly appreciated.

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CAREER CLUSTERS CONTENT FOR PREPARATION OF EDUCATIONAL PERSONNEL

The content of this report is based on the concept that occupations may be classified into logically related groups (clusters) on the basis of similar elements or characteristics such as skills, knowledge, requirements, functions and products produced or services rendered.

Career clustering is a technique which facilitiates curriculum organization, gathering and projecting labor market data, and organizing career guidance materials. Awareness of career clustering by education personnel in training is essential for guiding learning opportunities and implications of each individual student.

Desired Student Outcomes K-12

As a result of the K-12 experience each student should:

1. Be aware of the career cluster concept which holds that occupations may be classified into logically related groups (clusters) on the basis of similar elements or characteristics such as skills, knowledge, requirements, functions and products produced or serveices rendered.
2. Be able to relate personal aptitude and interests to clusters.
3. Be aware of career information including personpower need projections, elements of decision making, sources of career information, and any other information needed for planning the next step.

Desired Student Outcomes (Teacher Education Students)

As a result of the teacher education program each student should:

1. Be aware of sources of career information including labor market need projections.
2. Be able to direct students to career information including national, state and local sources, i.e., agencies, publications, delivery systems and resource people.
3. Be aware of the occupational implications of his/her academic speciality including any related careers.
4. Be aware of methods of gathering labor market needs and methods of grouping occupations in clusters.
5. Be aware of the resources available within his/her school setting which might assist students with their career development.
6. Be able to provide information regarding sources of career planning, placement and counseling.

Desired Student Outcomes (All College and Univeristy Students)

As a result of the college and university experience each student should:

1. Be aware of sources of career information including labor market need projections.

2. Be aware of the occupational implications of his/her academic speciality including any related courses.

Teaching/Learning Activities

In order to achieve the desired student outcomes it will be necessary for teaching/learning activities to be provided. These can best be accomplished when presented in a total framework rather than in fragmented pieces. The school environment should be considered in the broad context of the community, rather than to segregate classroom activities and community activities. The school building is part of the community, and learning can take place in many off-campus settings.

Many teaching/learning activities can be used to focus on career clusters within the regular curriculum. The following activities have been identified for use in the college and university classes.

1. Field Trips -- The preparation for and follow-up of the field trip will determine the success of this activity. The focus should be on the people, jobs, and skills involved rather than on the finished product.

2. Resource People -- Members of the community are a valuable source of information on occupations. Representatives from industry, the performing arts, college services, etc., may provide information on labor market needs, skills, competencies, requirements, and working conditions on various occupations. These resource people can be used to present their information to the different college and university classes.

3. Terminals -- Computer terminals and needle sort can be used to obtain employment information about the career clusters. The Career Information System (CIS) is an example of one of these terminal and needle sort programs that is commonly used.

   All students should complete the Quest booklet. They will then transfer their answers to the computer terminal for the results. If possible, students should be given the opportunity to use the needle sort system.

4. Visitations -- Students may visit businesses individually or in small groups to obtain current career information. Personnel directors and other business officials can provide individual needs better when working with a small group, than in a classroom or field trip setting.

University Faculty Competencies

Each faculty member should demonstrate a positive attitude toward career aspirations of their students by:

1. Being aware of sources of career information including labor market need projections.

2. Directing students to career information including national, state and local sources, i.e., agencies, publications, delivery systems, and resource people.

3. Being aware of the occupational implications of his/her academic speciality including any related careers.

4. Being aware of methods of gathering labor market needs and criteria for grouping occupations in clusters.

5. Being aware of the resources available within his/her school setting, which might assist students with their career development.

6. Providing information regarding sources of career planning, placement and counseling.

Teacher Education Faculty Competencies

Each teacher education faculty member should:

1. Be aware of sources of career information including labor market need projections.

2. Be able to direct students to career information including national, state, and local sources, i.e., agencies, publications, delivery systems, and resource people.

3. Be aware of the occupational implications of his/her speciality including any related careers.

4. Be aware of methods of gathering labor market needs and methods of grouping occupations in clusters.

5. Be aware of the resources available within his/her school setting which might assist students with their career development.

6. Be able to provide information regarding sources of career planning, placement and counseling.

7. Be able to provide instruction in planning and conducting activities regarding clusters and labor market need projections.

8. Be able to provide information to students regarding state and local graduation requirements as they relate to cluster and labor market information.

INTRODUCTION TO CAREER CLUSTER CONCEPT

The college or university should take into consideration for inclusion in the preparation of education personnel the student outcomes, teaching/learning activities, and the competencies discussed above. In addition college or university faculty need to have background knowledge about career clusters and information on how to use career clusters in providing optimum learning experiences for students. This section describes the basic elements of career clustering, types of clusters, and methods of gathering and disseminating labor market information.

Cluster Classification Criteria

Following are summaries of three types of criteria used in classifying career clusters.

Competency-Based Clusters are groups of occupations having similar requirements. To possess a competency means the worker has the skills, knowledge and the mental and physical abilities (cognitive, affective and psychomotor skills) to perform effectively the tasks required of the occupations, or the preparation necessary to take the next educational step. The Oregon Department of Education uses this method (competencies) as the basis for grouping occupations into clusters.

Industry-Based Clusters group occupations in a given business or industry within one cluster. In the agriculture-business and natural resources cluster most all phases of work with agriculture are classified as part of this cluster, including biologist, agricultural-chemical salesperson, farm equipment mechanic, or farmer. The industry itself is the determing factor. Jobs within the industry form the cluster. The U.S. Department of Labor uses this system as one way of gathering and reporting employment statistics.

Function-Based Clusters group those occupations which have common functions or "duties". The principal function of a physician is to provide health services which is the same function performed by a dentist, a registered nurse, a dental hygienist, a licensed practical nurse, and a nurses' aide (the difference between a physician and a nurses' aide is one of level, not of function). Function in this sense is defined as "a special duty or performance required of a person in the course of work or activity", as the function of a doctor is to medically help people. The Oregon Career Information System used this grouping process as a means of managing occupational information development.

Existing Cluster Taxonomies

In the Oregon Department of Education a "Cluster of Careers" is composed of occupations which are related because they include identical or similar skills and knowledge requirements. This structure implies that career education which is centered on the knowledge and skills common to occupations comprising a "cluster" should prepare students for entry into an "area" or "family" of occupations rather than a specific job. This approach should avoid premature commitment of the student to a narrow work speciality, and at the same time provide breadth in initial preparation to enable the student to cope more effectively with occupational and employment changes. In addition, such education should qualify students for subsequent enrollment in more concentrated and specialized education.

Educational programs based upon the cluster concept should develop entry-level competenices in a related variety of occupations and provide flexibiiity in terms of occupational, educational and geographical mobility.

Oregon Department of Education

In Oregon, fourteen approved clusters have been identified as having potential for public educational implementation (see Appendix II.) Four additional cluster areas have been identified and are currently under development. Before a cluster is identified as having general merit for public educational programs and financial support, the composite occupations of the cluster must include a minimum employment of 10,000 people in the state and indicate need for a minimum of 2,000 more employes to meet five-year expansion and replacement forecasts. The "Oregon Clusters" are used primarily as a way of organizing curriculum for vocational training in grades 11-12. Because of the requirement for a large labor market base and forecasted need, the Oregon clusters do not encompass the entire occupational spectrum. Furthermore, because of requirements related to the source of funding for the development of clusters in Oregon schools, focus has been almost exclusively on occupations which do not require a four-year college (or higher) degree. The Oregon State Board of Education has as a goal the enrollment of a minimum of seventy percent of all eleventh and twelth grade students in approved cluster programs by 1980. Oregon high school graduation requirements mandate that every student be provided career preparation opportunities whether or not the student elects to enroll in a cluster program.

United States Office of Education (USOE)

The U.S. Office of Education (USOE) groups occupations in fifteen clusters primarily on the basis of common function but including some common factors related to common industry orientation (see Appendix II). Like CIS, the USOE system includes occupations which require various educational backgrounds. The USOE cluster scheme has been adopted by many state education agencies and school districts outside Oregon. To facilitate organization of career information for career awareness and exploration, states or local school districts are encouraged to adapt this system to meet local needs. The Texas Education Agency has published a handbook relating 1000 occupations to the USOE clusters.

Career Information System (CIS)

The Oregon Career Information System (CIS), an organization designed to prepare and deliver information for career decision makers, groups occupational titles into twenty-four "clusters" based on common functions (see Appendix II). The occupations included in CIS clusters encompass more than 97 percent of the employment in the state of Oregon and include occupations which require all levels of educational preparation. Since the most useful level of specificity for people making career decisions is occupational titles -- not clusters, CIS clusters are rarely used except as a structuring system for managing information development about occupations. There is considerable compatibility between the Oregon State Department of Education clusters and the CIS occupations.

Labor Market Information — Methods of gathering labor market information.

Census Data -- Each ten-year period, 1950, 1960, 1970, 1980, etc., the U.S. Department of Commerce, Bureau of the Census does a comprehensive detailed survey of the population in the United States. The detailed occupational estimates for all 449 census occupations are used to up-date the file for employment estimates. These estimates are for all wage and salary workers, self-employed individuals and unpaid family members.

The Oregon data is included in two separate publications. One, a general publication, is entitled "General Social and Economic Characteristics: Oregon". The other is the detailed version entitled, "Detailed Characteristics, Oregon, 1970 Census of Population".

Strengths of these publications include a limited classification of all occupations and estimates for self-employed and unpaid family members. The single primary weakness of census data is that the worker, not the employer, identifies the nature of the job and decides the appropriate occupational title. This approach often results in an upgrading of the title to the level that suits the respondent and thereby tends to distort the true occupational title.

Census of Agriculture, Volume I -- Each five-year period, 1964, 1969, 1974, etc., the U.S. Department of Commerce, Bureau of the Census in cooperation with the U.S. Department of Agriculture, completes a comprehensive detailed survey of the farm population in each of the states and U.S. territories. The survey provides such data as number, type, size, dollar value of farms by agricultural products sold; machinery and equipment on farms, farm production expenses.

Oregon Employment Division Surveys -- Prior to 1970, the Oregon Employment Division conducted occupational surveys of employers in Oregon, called skill surveys. These surveys were adequate but did not provide reliable estimates of the true occupational title of the employee and likewise did not provide valid and reliable estimates of the employer's future needs for specific occupations. To correct this problem, Oregon in 1970 elected to be one of

nine states to participate with the U.S. Department of Labor in its first attempt to implement the Federal-State Occupational Employment Statistics (OES) Program.

This program is designed to collect occupational employment statistics on a recurring basis by using standardized job titles and descriptions designed for each of the specific industries. The occupational data supplied by this collection system will produce comparable employment estimates by occupation that can be used with much greater confidence by all participanting states.

Special surveys are conducted by the Employment Division as the occasion required. Examples of surveys conducted include (1) horticulturists and (2) wage and salary workers on farms not included in the OES survey of employers covered by unemployment insurance. (The OES Program surveys all employers required to pay unemployment insurance for their employees. On-farm employees are not required to be covered).

Local Educational Agencies -- School districts and colleges may conduct mail, phone or personal interview surveys. As census and employment division surveys become more complete and reliable, less need will exist to depend on local surveys. Local surveys may be most effective for determining new and emerging occupations.

Systems for Disseminating Information:

Career Program Planning System (CPPS) -- The major purpose of the Career Program Planning System is to provide data for the decision-making process in implementation of new and extension or curtailment of existing Career Education programs at the exploratory, preparation (high school) and specialization (post high school) levels. Allied benefits of the program include the identification of priority occupational areas for task analysis and curriculum development activities as well as the provision of data for student career counseling activities.

Demand/Supply Data -- The two types of data available are demand and supply. Personpower demand data indicated how many people are employed in specific occupations throughout the state and selected local areas, and how many will be needed in the coming years, whereas personpower supply data indicates how many people are being trained for specific occupations in various training institutions throughout the state. (The data collected is stored in a computer-based retrieval system accessed through the Oregon Department of Education.)

Organization of Occupations in System -- Some 3,500 occupations will be contained in the system. These occupations are identified by several methods in order that they can be retrieved, along with desired person-power demand and supply data, depending on the user's needs. Information is classified by:

Oregon Career Cluster Code (18) -- for use primarily by exploratory and high school program planners.

Worker Train Group Classifications (114) -- for use by awareness and exploratory program planners.

United State Office of Education (USOE) Code -- for use by specialization level planners, i.e., community college.

Dictionary of Occupation Number (9 digit) -- for use by anyone familiar with the DOT system.

Job Title and Alpha Description of the Occupation -- enables the user to retrieve occupations by name.

Career Information System (CIS) -- Career Information System (CIS), a statewide interagency consortium, provides current labor market, occupational, and educational information in useable form to students and clients, and assists in the integration of such information into schools and social agencies in Oregon. The purpose is to improve career and educational choices. This system is supported by user agencies on a cost-sharing basis.

CIS is being used in approximately two-thirds of the secondary schools in Oregon, all of the thirteen community colleges, various social agencies and several four-year colleges and universities.

Information is stored in computers. Students have access to the information through a teletype terminal or a needle sort system accompanied by updated computer printouts.

Publications-Federal -- The Dictionary of Occupational Titles (DOT) is a two volume set of descriptive information concerning most jobs in the American economy. It is published by the U.S. Department of Labor every ten years. The next expected revision is in 1976. The DOT provides a classification structure under which these occupations are arranged according to their interrelationships. The standardization of job titles, along with the definition of what each job involves, provides a unique operating tool to the public employment service, counselors, educators, the personnel world and employers at large. Volume I is a definition of titles and Volume II is an occupational classification index and industry index.

The Occupational Outlook Handbook (OOH) -- is a biennial publication of the U.S. Department of Labor. The OOH provides encyclopedic information on work for over 800 occupations and thirty major industries. For hundreds of occupations, the Handbook answers such questions as: what does a person actually do on the job? what abilities and interests does the job call for? what kinds of schooling and other training is required for the job? what are the working conditions? what will be the job opportunities in coming year? The information in the Handbook is designed for career guidance purposes.

The Occupational Outlook Quarterly -- is a how-to-do-it magazine published four times a year covering new and emerging jobs, training and educational opportunities, salary trends, and job prospects through the mid-1980's. The quarterly gives counselors, educators, and other personpower specialists up-to-date information on careers between editions of the OOH. It discusses new perspectives on employment problems and changing technology, includes a bibliography of new government publications on personpower and career opportunities and gives a summary of the latest Bureau of Labor Statistics' report on employment trends and occupational outlook.

Publications-State -- Personpower need studies are being conducted continuously by various state agencies. Material currently available is listed in the bibliography for this report.

Relevant Resource Material -- The following material may be helpful to university faculty seeking an understanding of the clustering concept and of careers within clusters:

1. "Comparative Occupational Listings Within Three Clustering Criteria"
2. CHOICE
3. "Key Occupations in the ODE Clustering System"
4. "The Cluster Curriculum in a Career Education Program"
5. "Some Occupations Related to Interest and Ability"
6. "Building Construction Occupational Cluster Guide"
7. "Summary of Employment Trends in Service Occupations" (One is available for each Oregon cluster)

If educational personnel in training are to develop the necessary career cluster competencies, the college and university faculty involved in preparation education programs must be more knowledgeable about career clusters. They must demonstrate the process of using career clusters information so that those in training will be exposed to necessary content and strategies needed to successfully gather and utilize career cluster information in their various education roles.

Recommendations

For preparation of education personnel programs to be relevant to the needs of the public schools, it is essential that the college and university personnel be aware of what is taking place in the schools and in business and industry relative to training needs. The Task Force suggests the following:

1. That the information relating to cluster and labor market projections be conveyed to university faculty through workshops, inservice training, seminars, and/or discussion groups.

2. That the Task Force Report be reviewed and updated within two years, because information regarding clusters and labor market projections is constantly changing.

3. That university and other appropriate professional associations be made aware of the efforts of this project, in the hope that, though their bulletins and newsletters, a climate of acceptance will be established.

4. That a handbook be developed and distributed to university faculty that relate career clusters and occupations to academic disciplines. It would be helpful if such a handbook were to include information regarding the occupations of graduates of various majors.

5. That current occupational and labor market information be provided to university faculty.

6. That those responsible for the development and updating of material related to career cluster and labor market information coordinate their efforts through continual communication.

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14. Occupational Profiles of Selected Wholesale and Regail Trade Industries in Oregon--1973. Employment Division, Department of Human Resources, State of Oregon, Salem, Oregon, 1975.

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16. Steps Beyond High School. Oregon Department of Education, Salem, Oregon. Published annually.

17. Summary Labor Force Trends. Employment Division, Department of Human Resources, State of Oregon, Salem, Oregon. Monthly publication.

18. Summary of Employment Trends in Child Care, Clothing, and Institutional and Home Management Occupations. Department of Education, Division of Instructional Support, State of Oregon, Salem, Oregon, 1975. (One is published for each cluster.)

Appendices

APPENDIX I

Selected Clusters

a. Accounting

(1) Description

To make important decisions managers must have up-to-date financial information. This kind of information is furnished by accountants who prepare and analyze financial reports.

Three major accounting fields are public, management, and government accounting. Public accountants are independent practitioners or employees of accounting firms. Management accountants, often called industrial or private accountants, handle the financial records of their firms. And government accountants examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often specialize in areas related to their accounting field. Many public accountants specialize in auditing (reviewing a client's financial records and reports to judge their reliability), while others advise clients on tax matters and other financial and accounting problems. Management accountants provide the financial information that executives need to make intelligent business decisions. They may specialize in taxes, budgeting, investments, or internal auditing (examining and appraising their firms' financial systems and management control procedures). Many accountants in the federal government work as Internal Revenue agents, investigators, and bank examiners; other government agents have regular accounting positions.

Certified Public Accountant	Private Accountant
Certified Management Accountant	Estimator
Public Accountant	Auditor
Management Accountant	Treasurer
Industrial Accountant	Revenue Officer
	Budget Specialist

More than 700,000 people worked as accountants in 1972; about 20 percent were Certified Public Accountants (CPA's). About 3 percent of the CPA's and 22 percent of all accountants were women.

Approximately 60 percent of all accountants do management accounting work. An additional 20 percent are engaged in public accounting as proprietors, partners or employees of independent accounting firms. The remaining 20 percent work for federal, state, and local government agencies, or teach in colleges and universities.

Accountants are found wherever business, industrial or government organizations are located. Most, however, work in large urban areas where many public accounting firms and central offices of large businesses are concentrated.

Training in accounting is available at colleges and universities,

accounting and business schools, and correspondence schools. Although many graduates of business and correspondence schools are successful in small accounting firms, most large public accounting and business firms require applicants to have at least a bachelor's degree in accounting or a closely related field. Many employers prefer those with the master's degree in accounting. For beginning accounting positions, the federal government requires four years of college training including twenty-four semester hours in accounting or related subjects or an equivalent combination of education and experience. For teaching positions, most colleges and universities require a master's degree or a doctorate with the Certified Public Accounting Certificate.

Previous work experience in accounting can improve an applicant's employment chances. Many colleges offer students an opportunity to gain experience through internship programs conducted by public accounting or business firms.

Anyone working as a "certified public accountant" must hold a certificate issued by the State Board of Accountancy. All states use the CPA examination, administered by the American Institute of Certified Public Accountants, to establish certification. Although only half the states require CPA candidates to be college graduates, most successful candidates have college degrees. Nearly all states require applicants to have at least two years of public accounting experience for a CPA certificate.

Requirements vary, but more than half the states restrict the title "public accountant" to those who are licensed and registered. Information on requirements may be obtained directly from individual state boards of accountancy or from the National Society of Public Accountants.

People planning a career in accounting should have an aptitude for mathematics. Neatness and accuracy also are necessary. Employers seek applicants who handle responsibility and work with little supervision.

Accountants who want to advance in their profession usually must continue their study of accounting even though they already have college degrees or CPA certificates. They may take part in seminars sponsored by various professional associations or take courses offered by their employers. An increasing number of accountants study computer operation and programming to adapt accounting procedures to new data processing methods. Although capable accountants may advance rapidly, those having inadequate academic preparation are likely to be assigned routine jobs and may find promotions difficult to obtain.

Junior public accountants usually start by assisting with auditing work for several clients. They may advance to intermediate positions with more responsibility in one or two years and to senior positions within another few years. In large firms, those who deal successfully with top industry executives often become supervisors, managers, or partners, or transfer to executive positions in private firms. Some open their own public accounting firms.

Beginning management accountants often start as ledger accountants,

junior internal auditors, or as trainees for technical accounting positions. They may advance to jobs such as chief plant accountant, chief cost accountant, budget director, senior internal auditor, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents or corporation presidents. In the federal government, beginners are hired as trainees and usually promoted in a year or so. In college and university teaching, those having minimum training and experience may receive the rank of instructor without tenure; advancement and permanent faculty status depend upon further education and teaching experience.

Accountants often work very long hours under heavy pressure during the tax season, and some travel extensively. The majority, however, remain in one office and work between thirty-five and forty hours a week, under the same general conditions as fellow office workers.

Starting salaries of beginning accountants in private industry were $9,100 a year in 1972, according to a Bureau of Labor Statistics survey in urban areas. Earnings of experienced accountants ranged between $11,900 and $17,400, depending on their level of responsibility and the complexity of the accounting system. In general, experienced accountants earn about twice as much as average earnings of all nonsupervisory workers in private industry, except farming. Chief accountants who direct the accounting program of a company or one of its establishments earned between $15,300 and $26,500, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged $9,600 a year, while experienced auditors' earnings ranged between $12,900 and $15,900.

Salaries are generally somewhat higher for accountants holding a graduate degree or a CPA certificate. Earnings also are higher for those who are required to travel a great deal.

In the Federal Civil Service the entrance salary for junior accountants and auditors was about $7,700 in early 1973. Candidates who had superior academic records received a starting salary of about $9,500. Some auditors began at about $10,000. Experienced accountants in the federal government averaged about $20,000 a year. Those with administrative responsibilities earned more. (1)

[2] Projected Labor Market Needs

Employment of accountants is expected to increase rapidly through the mid-1980's as businesses and government agencies continue to expand in size and complexity. Thousands of additional openings will occur as employees die, retire, or leave their jobs to seek other work.

Greater use of accounting information in business management, changing tax systems, and growth of large corporations that must provide financial reports to stockholders all point to excellent opportunities for accountants. Because of the growing complexity of business accounting require-

ments, accountants with college degrees will be in stronger demand than those who lack this education. In addition, the trend toward specialization will create opportunities for people trained in a specific phase of accounting.

As data processing systems continue to replace manual preparation of accounting records and statements, the need for some lower level accountants may be reduced or eliminated. On the other hand, many highly trained accountants will be required to prepare, administer, and analyze the information made available by these systems.

REFERENCE

1. U. S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington: G.P.O. Bulletin 1785, 1975.

b. Agriculture and Agri-Business

[1] Description

The agriculture cluster is one that is involved in the training of persons interested in agricultural occupations. An occupation in agriculture is defined as one which requires knowledge and skills in one or more of the primary areas of plant science, soil science, animal science, farm management, agricultural mechanization and agricultural leadership.

Opportunities for persons qualified to work in many areas of this cluster are good, especially for persons who have farm backgrounds and who desire to find employment in agri-business. The latter includes the wide variety of businesses which serve production agriculture (those actually engaged in producing crops and livestock). Enrollment in university schools and colleges of agriculture is at a high level and graduates are currently quite successful in securing employment related to their training and qualifications.

The following is a partial list of careers in agriculture requiring a bachelor's degree or more:

Agricultural Engineering
Agricultural Chemist
Soil Scientist
Soil-Fertility Expert
Agronomist
Zoologist
Plant Ecologist
Agricultural Economist
Extension Service Specialist
Veterinary Meat Inspector
Veterinarian
Animal Husbandman
Poultry Husbandman
Dairy Husbandman
Horticulturist
Dairy Technologist
Entomologist
Botanist
Biologist
Biochemist
Plant Breeder
Geneticist
Microbiologist
Plant Scientist
Plant Quarantine Inspector
Plant Pest Control Inspector
Human Nutritionist
Rural Sociologist
Agricultural Educator
Farm Manager
Forester

Government agencies, colleges, agricultural experiment stations, and private businesses that deal with farmers hire research workers. They also employ people to take technical and administrative responsibilities in public agencies involving farmers or programs affecting farmers. Agri-businesses, farm cooperatives, private businesses, commercial and financial companies that buy from, sell to, or serve farmers, also employ many professionals with agriculture-related training. States, counties, and municipalities employ many who serve as vocational agriculture teachers and workers in agricultural communications, in farmers' organizations, or in trade associations whose members deal with farmers.

The number of research activities related to agriculture has increased very rapidly. The largest agencies in this field are the state agricultural

experiment stations connected with the land-grant colleges and the various research branches of the U. S. Department of Agriculture. Such agricultural specialists work for other research organizations in independent research and for companies that finance farming operations, market farm products, or produce chemicals, equipment, and other supplies or services for farmers. The U. S. Department of Agriculture employs workers in research positions in various parts of the country: in Washington, D. C.; at the Agricultural Research Center at Beltville, Md.; and at land-grant colleges. Other government departments also have many agricultural research jobs. Various independent research organizations, foundations, and private business groups in many parts of the country recently have also initiated research related to agriculture. They tend to be located either in industrial centers or in areas high in agricultural activity, and include producers of feed, seed, fertilizer, and farm equipment; and of insecticides, herbicides, and other chemical dusts and sprays.

Public and private lending institutions which make loans to farmers employ men with broad training in agriculture and business. These workers ordinarily are required to have had practical farm experience as well as academic training in agriculture, economics, and other subjects. Making financially sound loans involves careful analysis of the farm business and proper evaluation of farm real estate and other farm property. These workers are employed by the cooperative Farm Credit Administration in its banks and in associations operating under its supervision throughout the country by the Farmers Home Administration in state and county offices throughout the country, by rural banks, and by insurance companies that have substantial investments in farm mortgages.

The federal and state governments also employ various specialists in activities relating to agriculture. These specialists have technical and managerial responsibilities in activities such as programs relating to the production, processing, marketing, inspection, and grading of farm products; prevention and spread of plant pests, animal parasites, and diseases; and management and control of wildlife.

Large numbers of professionally trained persons are employed by cooperatives and business firms that deal with farmers. Employment in these organizations may be expected to expand, as farmers rely increasingly on them to provide farm supplies, machinery, equipment, and services, and to market farm products. The size of the organization and types of services it offers determine the number of its employees and the nature of their jobs. Large farm supply cooperatives and businesses, for example, may have separate divisions for feed, seed, fertilizer, petroleum, chemicals, farm machinery, public relations, and credit.

Agricultural communications is another expanding area of specialization. Crop reporters and market news reporters are employed by the U. S. Department of Agriculture in field offices throughout the United States. Crop reporters gather information on crop production during all stages of the growing season. Market news reporters collect information on the movement of agricultural produce from the farm to the market. Radio and television farm directors are employed by many stations to report prices,

sales, grades, and other agricultural information to farm residents. Agricultural reporters and editors compile farm news and data for farm journals, bulletins, and broadcasts.

The nationwide, federally-aided program of vocational education offers employment for persons technically trained in agriculture and related subjects. Teachers of vocational agriculture not only teach high school students interested in farming, but provide organized instruction to assist young farmers in becoming satisfactorily established in farming and in becoming community leaders. They also provide organized instruction for adult farmers, giving individual consultation at their farms to keep them abreast of modern farm technology.

The qualifications of workers in all of these fields ordinarily include a college education and special training in a particular line of work. In most of these fields, the demand for workers exceeds the supply. In recent years, the demand has been increased because of the need to recruit professional personnel to staff agricultural missions to other countries and to give technical aid to agricultural institutions and farmers there.

Management is the key to success in modern farming. Today's farmer needs a much higher level of knowledge and skills than his predecessor. College training in management is becoming the rule rather than the exception for the young "commercial" farmer. It gives him the technical basis that he needs to keep up with new developments in research and technology and to apply them intelligently on his own farm. Biology, engineering, chemistry and agronomy-not to mention economics, marketing and accounting-are part of the necessary kit of tools for a successful farmer today.

Persons interested in careers in agriculture need to be in good physical condition, have had possible experience in 4-H clubs, and have experienced success in agricultural courses in high school or agricultural school. They also need to have an interest in outdoor work, an ability to comprehend and make practical application of principles of agricultural science, finger and manual dexterity, eye-hand coordination and an interest in the agricultural field. Persons working in agriculture will perform their duties in the fields outdoors, in an office or in a school.

Agricultural production offers challenging and rewarding careers, with large incomes and better living conditions than it used to, but it offers them to fewer and fewer people. In 1969 nearly 20 percent of U. S. farms accounted for nearly 72 percent of U. S. farm sales. This is the expanding sector of U. S. agriculture. The number of small farmers with incomes under $20,000 is decreasing.

Professional workers' salaries in agriculture are competitive with salaries in other professions. They range from $8,700 for a beginning public school agriculture teacher (1) to $37,000 or more for an experienced government specialist. (2)

[2] Projected Labor Market Needs

Although opportunities for college graduates in agriculture-business are relatively good, the opportunities for getting started as an entrepreneur in actually growing crops or raising livestock are quite the opposite. In general farming, one usually would need from $100,000 to $350,000 or more capital. Whereas fifty years ago there was ample opportunity to get started in production agriculture through primarily hard work; today one needs specialized experience and college training and a lot of dollars. The best way to get started in production agriculture today is to "inherit or marry a farm". There are, or course, exceptions to this. For example, one can get started in raising ornamental shrubs on a small scale with limited capital and gradually increase the scope of the operation.

For decades the trend was one way--away from the farm and small towns to the city. But no more. Rural counties in many parts of the country (the West, the Ozarks, Florida and the northern rim of Michigan, Wisconsin, and Minnesota) report at least a 10 percent gain in population over the last five or six years. Job opportunities are better. Even more important, the lure of rural America grows as urban ills get worse. And something else is happening, too. More young people--those in their late teens, twenties, and early thirties--are taking to farm life. Mainly, they are interested in agriculture as a career, and many have trained for it.

REFERENCE

1. Forest Grove School District, Salary Schedule, 1975-76.

2. Information obtained in correspondence with Department of Labor, 15 April 1976.

c. Construction

[1] Description

In the construction cluster there are mainly three occupations that require a baccalaureate degree. They are civil engineer, architect, and landscape architect. In other occupations in this cluster a baccalaureate degree might enhance one's performance, such as specification writer, engineering, but the three previously mentioned require a bachelor's degree for employment.

Civil engineering is one of the oldest branches of the profession. These engineers design and supervise the construction of roads, harbors, airfields, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental, sanitary, transportation (including highways and railways), and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from site supervisor of a construction project or city engineer to top level executive. Some are engaged in design, planning, research, and inspection; others teach in colleges and universities or work as consultants.

About 180,000 civil engineers were employed in 1972. Most are employed by federal, state, and local government agencies and the construction industry. Many work for consulting engineering and architectual firms or as independent consulting engineers. Others work for public utilities, railroads, educational institutions, and in the iron and steel and other major manufacturing.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They are often called upon to work at construction sites and are sometimes stationed in remote areas or in foreign countries. In some jobs, they must often move from place to place to work on different projects.

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. About 280 colleges, universities, and engineering schools offer a bachelor's degree in engineering. In a typical four-year curriculum, the first two years are spent on basic science--mathematics, physics, and chemistry--and the humanities, social sciences, and English. The last two years are devoted to engineering with emphasis on a speciality.

Engineers should be able to work as part of a team, be creative and have initiative, an analytical mind, a capacity for detail, and the ability to make decisions. They should be able to express their ideas to specialists in other areas. Because of rapidly changing technologists, engineers must be willing to continue their education throughout their career.

New engineering graduates with a bachelor's degree and no experience had average starting salaries of $10,700 a year in private industry in

1972 although salaries vary by branch of engineering. Master's degree graduates with no experience averaged almost $12,300 a year; Ph.D. graduates averaged about $16,400.

In the federal government in early 1973, engineers with a bachelor's degree and no experience could start at $7,694 or $9,520 a year, depending on their college records. Beginning engineers with a bachelor's degree and one or two years of graduate work could start at $9,520 or $11,614. Those having a Ph.D. degree could begin at $13,996 or $16,682.

In colleges and universities, engineers with a Ph.D. degree started in 1972 at about $12,500 a year as assistant professors for a nine or ten month academic year.

Most engineers can expect an increase in earnings as they gain experience. Average salaries of experienced engineers are about twice those of nonsupervisory workers in private industry, except farming. According to an Engineering Manpower Commission Survey, the average salary for engineers with twenty-one to twenty-three years of experience was $19,600 in 1972. Some in top-level executive positions had much higher earnings. (1)

Architects provide professional services to clients planning to build. The architect and client first discuss the purposes, requirements and cost of a project, as well as any preference on design that the client may have. Preliminary drawings are made; from these the architect develops a final design showing the floor plan and the structural details of the project. He then prepares working drawings showing the exact dimensions of every part of the structure and the location of plumbing, heating units, electrical outlets and air conditioning. Architects also specify the project's building materials, construction equipment, and possibly the interior furnishings.

They design a wide variety of structures such as houses, churches, hospitals, office buildings and airports. They also design multi-building complexes for urban renewal projects, college campuses, industrial parks, and new towns. Besides designing structures, architects also may help in selecting building sites, preparing costs and land use studies, and long range planning for site development.

About 37,000 registered (licensed) architects were employed in 1972; fewer than 5 percent were women. Many other unlicensed architectural school graduates work in positions requiring knowledge of architecture, for example, as supervisory or sales personnel with firms in the building industry.

About two-thirds of all architects are self-employed, either practicing individually or as partners. Most of the others work for architectural firms. However, architects also work for builders, for real estate firms, and for other businesses that have large construction programs. Some work for government agencies, often in city and community planning or urban redevelopment. About 1,400 architects are employed by the federal government, mainly for the Departments of Defense, Housing and

Urban Development, and Interior and the General Services Administration.

All states and the District of Columbia require a license for the practice of architecture, mainly to insure that architectural work which may affect the safety of life, health or property is done by qualified architects. Requirements for admission to the two-day licensing examination generally include graduation from an accredited architectural school, followed by three years of experience in an architect's office for those with a bachelor's degree and two years for those with a master's degree.

Persons planning careers in architecture should be able to work independently, have a capacity for solving technical problems, and be inclined toward artistic creation. Also they must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. Those planning a career in architecture should be interested in social studies and have a strong desire to serve the public since architectural work affects people's lives, health and safety.

New graduates usually begin as junior draftsmen in architectural firms where they make drawings and models of structures under the direction of a registered architect. After several years of experience an architect usually will establish a private practice, a common goal of architects.

In the private industry, starting salaries for new architectural school graduates are generally between $125 and $175 a week in 1972, according to the limited information available.

Architects with well-established private practices generally earn much more than high-paid salaried employees of architectural firms. Although the range in their incomes is very wide, some architects with many years experience and good reputations earn well over $25,000 a year. On the other hand, young architects starting their own practices may go through a period when their expenses are greater than their incomes.

Depending on their college records, architects having a bachelor's degree and no experience could start in the federal government at either $150 or $185 a week in early 1973. Architects who have completed all requirements for the master's degree can start at $225, and those with a Ph.D., at $320 a week. (1)

Most work in well-equipped offices and spend long hours at the drawing board. They sometimes have to work overtime to meet deadlines. The routine often is varied by interviewing clients or contractors and discussing the design, construction procedures, or building materials on project with other architects or engineers. Those involved in contract administration frequently work outdoors inspecting construction sites.

Landscape architects assist many types of organizations in planning and designing projects. These may range from a real estate firm starting a new suburban development to a city building an airport or park. They assist in designing the arrangement of trees, shrubbery, walkways, open spaces, and other features of the project's site, and may also supervise

the grading, construction, and planting required to carry out the plan. Some specialize in certain types of projects such as parks and playgrounds, campuses, hotels and resorts, shopping centers, roads, or public housing. Still other may specialize in certain services such as regional planning and resource management, site selection, feasibility and cost studies, or site construction.

About twelve thousand persons worked as landscape architects in 1972; 10 to 15 percent were women. Most landscape architects are self-employed or work for private architectural, landscape architectural, or engineering firms. Government agencies concerned with public housing, city planning, urban renewal, highways, parks, and recreation employed about 40 percent of all landscape architects. The federal government employed about six hundred, mainly in the Departments of Agriculture, Defense and Interior, and Housing and Urban Development. Some landscape architects were employed by landscape contractors, and a few taught in colleges and universities.

A bachelor's degree in landscape architecture is usually the minimum educational requirement for entering the profession. At least sixty-four colleges and universities offer this training. The curriculum for a bachelor's degree requires four to five years of study depending on the institution. Twelve universities offer a master's degree in landscape architecture.

Twenty-six states, including Oregon, require a license for independent practice of landscape architecture. Admission to the licensing examination usually requires a degree from an accredited school of landscape architecture plus two to four years of experience.

Persons planning careers in landscape architecture should be interested in art and nature since the work requires a talent for design and an understanding of plant life. Self-employed landscape architects also must understand business practices and be able to deal with others since bidding for contracts is often necessary. Working for landscape architects or landscape contractors during summer vacations increases one's understanding of the practical problems of the profession, and the experience may be helpful in procuring employment after graduation.

In 1972 starting salaries in private firms for new graduates having a bachelor's degree in landscape architecture ranged from about $8,000 to $12,000 annually; holders of a master's degree generally earned starting salaries between $9,500 and $13,500. Earnings of experienced landscape architects in private firms were very high--$16,000 to $21,000 a year in 1972--compared to average earnings of nonsupervisory workers in private industry, except farming.

Landscape architects in independent practice often earn more than salaried employees with considerable experience, but their earnings may fluctuate widely from year to year.

In early 1973, the federal government paid new graduates with a bachelor's degree annual salaries of $7,694 or $9,520 depending on their qualifications. Those with advanced degrees had starting salaries ranging

from $11,614 to $16,682 a year. (1)

Salaried employees both in government and in landscape architectural firms usually work regular hours. Often self-employed persons work long hours. Salaried employees in private firms may also work overtime during seasonal rush periods or to meet deadlines.

[2] Projected Labor Market Needs

Opportunities for civil engineers should increase rapidly through the mid-1980's. Job opportunities will result from the growing need for housing, industrial buildings and highway transportation systems created by an increasing population and expanding economy. Work related to problems of urban environment such as water and sewage systems, air and water pollution, urban redevelopment, and rapid transit systems may require additional civil engineers.

Employment trends for architects are expected to be favorable through the mid-1980's. Several thousand openings will occur annually due to the very rapid growth of the profession and in new areas of work resulting from expanded need in business and government for people with professional design training. Openings for positions with established architectural firms and opportunities for starting a private practice are expected to grow more slowly.

Employment opportunities for graduates with professional training in landscape architecture are expected to be favorable through the mid-1980's. Also, additional workers of all three fields will be needed each year to replace those who die, retire, or change occupations.

REFERENCE

1. U. S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1789, 1975.

d. Electricity/Electronics

[1] Description

Electrical engineers design, develop, and supervise the manufacture of electrical and electronic equipment including electric motors and generators; communications equipment; electronic equipment such as heart pacemakers, pollution measuring devices, radar, computers, lasers and missile guidance systems, and electrical appliances of all kinds. They also design and assist in operating facilities for generating and distributing electrical power.

Electrical engineers generally specialize in a major area of work such as electronics, electrical equipment manufacturing, communications, or power. Others specialize in sub-divisions of these broad areas like computers or missile and tracking systems. Many are engaged in research, development, and design activities. Some are in administrative and management jobs; others work in various manufacturing operations or in technical sales or teaching positions.

Electrical engineering is the largest branch of the profession. More than 230,000 electrical engineers were employed in 1972, mainly by manufacturers of electrical and electronic equipment, aircraft and parts, business machines, and professional and scientific equipment. Many work for telephone, telegraph and electric light and power companies. Large numbers are employed by government agencies and by colleges and universities. Others work for construction firms, for engineering consultants, or as independent consulting engineers.

In 1972, according to the College Placement Council, new engineering graduates with a bachelor's degree and no experience had average starting salaries of $10,700 a year in private industry. Master's degree graduates with no experience averaged almost $12,300 a year; Ph.D. graduates, $16,400.

In federal government in early 1973, engineers with a bachelor's degree and no experience could start at $7,694 or $9,520 a year, depending on their college records. Beginning engineers with a bachelor's degree and one or two years of graduate work could start at $9,520 or $11,614. Those having a Ph.D. degree could begin at $13,996 or $16,682.

In colleges and universities engineers with a Ph.D. degree started at approximately $12,500 a year as assistant professors for a nine or ten month academic year.

According to the Engineering Manpower Commission Survey, the average salary for engineers with twenty-one to twenty-three years of experience was $19,600 in 1972. These figures illustrate that most engineers can expect an increase in earnings as they gain experience. In fact, executives in some top-level positions had earnings much higher than $19,600. (1)

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates

trained in one of the natural sciences or mathematics also may qualify for some beginning jobs.

Graduate training is being emphasized for an increasing number of jobs; it is essential for most beginning teaching and research positions and desirable for advancement.

About 280 colleges, universities and engineering schools offer a bachelor's degree in engineering. Although most schools offer the larger branches of engineering, some specialities are taught in very few institutions. Students desiring specialized training should be familiar with various curriculums before selecting a college.

In a typical four-year curriculum the first two years are spent on basic science--mathematics, physics, and chemistry--and the humanities, social sciences and English. The last two years are devoted to engineering with specialized emphasis. Some programs offer a general engineering education, and the student chooses a speciality in graduate school or acquires one on the job. Some engineering curriculum require more than four years to complete.

All fifty states and the District of Columbis require licensing for engineers whose work may affect life, health or property or who offer their services to the public. Many engineers register in the local area or state. The requirements for registration usually include graduation from an accredited engineering school plus four years of experience and the passing of a state examination.

Engineers should be able to work as a part of a team, be creative, and have initiative, an analytical mind, a capacity for detail, and the ability to make decisions. They should be able to express their ideas to specialists in other area such as marketing and production planning. Because of rapidly changing technologies, engineers must be willing to continue their education throughout their careers.

Electrical engineers generally work under quiet conditions in modern offices and research laboratories. Some, however, may be involved in more active work in mines, at construction or missile sites, or in some other outdoor location.

[2] Projected Labor Market Needs

Job opportunities for electrical engineers are expected to increase rapidly through the mid-1980's. Increased demand for electrical equipment such as computers and sensing devices, to automatically control production processes is expected to be among the major factors contributing to this growth. The demand for electrical and electronic consumer goods in conjunction with increased research and development in nuclear power generation should create job openings for electrical engineers. Many will also be needed to replace personnel who retire or die.

The long range outlook for electrical engineers assumes that defense spending in the mid-1980's will be somewhat lower than the peak Vietnam

levels. If defense activity should differ substantially from this present outlook, the demand for electrical engineers will be affected.

REFERENCE

1. U. S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington: G.P.O., Bulletin 1785, 1975.

e. Environment

[1] Description

The environmental cluster includes all occupations involved with helping us live within our physical environment. Most of these occupations deal with solving environmental pollution problems and controlling these factors.

A large number of these positions require a bachelor's degree, or a degree is preferred. With the increased demands and interest in maintaining prescribed environmental standards, employment opportunities will continue strong through the mid-1980's. (1)

A sampling of the occupations in the environmental cluster would include: (1, 2, 3)

Earth scientists	Oceanographers
Geologists	Soil convervationists
Mineralogists	Foresters
Meteorologists	Park naturalists
Environmental scientists	Life scientists
Environmental educators	Environmental monitors

Personnel in the Environmental Careers are employed by many governmental branches and agencies and most segments of private industry. These career opportunities are available in rural, suburban, and large metropolitan sites. Obviously, the rural and metropolitan environmental opportunities have different criteria for selection that a prospective employee should consider.

Most of the environmental careers centered around science and research, technology and education, or technology implementation require a degree. (4) Broadly speaking, these careers fall into either the theoretical or "pure" science or the practical or "applied" sciences. Some environmental careers are the economic, social, or one of many other areas of study.

The one commonality of this area is a concern for our physical surroundings. The preparation, skills, knowledge, and training requirements are very diverse; as are the working conditions for different occupations within this cluster.

The anticipated salary earnings vary widely with job title and type of employing agent. Federal government, state agencies, and private business all have independent salary and wage scales, but the minimum starting figure is about $8,500.00 annually. Many of the positions with a master's degree and several years experience will provide over $1400 monthly income. (3)

[2] Projected Labor Market Needs

The labor market needs of this occupation are very difficult to predict. The occupational growth patterns for environmental careers have been tied to four factors by Olympus Research Corporation for the U.S.O.E. (4)

These are:

1. Governmental appropriations in actual dollars spent for environmental programs and projects;

2. Past percentages of the Gross National Product and the federal budget;

3. General population growth, and replacing deceased or retired personnel; and

4. Fluctuating birthrate, an example being the current surplus of teachers.

Using these four factors as a basis for conclusions, and additional references for supporting information, we can anticipate growth in these occupations. Society is demanding preservation of the environment; industry is being forced to conform; and we have a strong future.

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f. Fine Arts and Humanities

[1] Description

The fine arts and humanities cluster encompasses the network of activities and related occupations which focus on developing, promoting, transmitting, and preserving the social, moral and aesthetic values of a culture. The network includes primary artistic production (visual, verbal and performing arts), the study of man and his relationship in and to society (the humanities and social sciences), and related delivery systems and support services (museums, libraries, archives and schools).

The following is a partial list of careers in the fine arts and humanities cluster that require or recommend a bachelor's degree or a bachelor of fine arts degree, or more:

Drama Coach	Art Therapist
Actor-Actress	Writer
Choreographer	Interpreter and Translator
Dancer	Dance Instructor
Painter	Musician
Sculptor	Singer
Arts Administrator	Printmaker
Interior Designer	Minister
Commercial Artist	Archivist
Music Therapist	Archeologist

Actors, Actresses. About 9,000 actors and actresses work in the United States. (1) The principal areas of employment for actors are stage plays, motion pictures (including films made for television), industrial shows and commercials.

In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer months, stock companies in suburban and resort areas throughout the nation provide many opportunities for employment. In addition, many cities now have "little theatres," repertory companies and dinner theatres, which provide opportunities for local talent as well as for professional actors and actresses from New York and other centers. Plays that go "on the road" are normally produced in New York City with casts selected there.

Employment in motion pictures and film television is essentially centered in Hollywood and New York City although a few studios are located in Miami and other parts of the country. In addition, many films are shot on location, providing employment for nonprofessionals who live in the areas as "extras." An increasingly large number of American-produced films are being shot in foreign countries. In television, most opportunities for actors are at the headquarters of the major networks--in New York, Los Angeles, and maybe Chicago. A few local television stations occasionally employ actors.

Young persons who aspire to acting careers should take part in high school and college plays, or work with little theatres and other acting

groups in their home towns to get as much acting experience as possible.

Formal training in acting is increasingly necessary. Such training can be obtained at special schools of the dramatic arts, located chiefly in New York, and in more than 1,600 colleges and universities throughout the United States. College drama curriculum usually includes courses in liberal arts, speech, pantomime, play production, and history of the drama, as well as practical courses in acting. From these, the student develops an appreciation of the great plays and a greater understanding of the roles he may be called on to play. Graduate degrees in the fine arts or in drama are needed for college teaching positions.

Acting demands patience and total commitment since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and often do much traveling. Flawless performances require long rehearsal schedules and the tedious memorizing of lines. The actor or actress needs stamina to withstand the heat of stage or studio lights or the adverse weather conditions which may exist "on location." Above all, young persons who plan to pursue an acting career must have talent and the creative ability to portray different characters. They must have poise, stage presence, and aggressiveness to project themselves to the audience. At the same time, the ability to follow directions is important.

In all media, the best way to start is to use local opportunities and to build on the basis of such experience. Many actors who are successful in local dramatic productions eventually try to appear on the New York stage. Inexperienced actors usually find it extremely difficult to obtain employment in New York or Hollywood. The motion picture field is especially difficult to enter, and employment often results from previous experience on Broadway.

Actors and actresses employed in the legitimate theater belong to the Actors' Equity Association. If employed in motion pictures, including television films, they belong to the Screen Actors Guild, Inc. or to the Screen Extras Guild, Inc. If employed in television or radio, they belong to the American Federation of Television and Radio Artists (AFTRA). These unions and the show producers sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also enters into a separate contract which may provide for higher salaries than those specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about $197.50 in 1972. Those in small "off-Broadway" theaters received a minimum of $125 a week. For shows on the road, the minimum rate was about $274.50 a week. (1)

Motion picture actors and actresses earned a minimum daily rate of $140, or $483 for a five day week, in 1972. For extras, the minimum rate was $35.65 a day. Actors on network television received a minimum program fee of about $180 for a single half-hour program and ten hours of rehearsal time; actors on radio received about $50 for a half-hour performance, including one rehearsal hour. Because of the frequent periods of unemployment characteristic of this profession, annual earnings may be low for many

lesser-known performers. In all fields, many well-known actors and actresses have salary rates above the minimums. Salaries of the ten top stars are many times the figures cited. (1)

Dancers. About 4,000 dancers worked on the stage, screen and television in the U. S. in 1972. Many more teach at schools of the dance and in other schools and colleges. A few teachers, trained in dance therapy, work in mental hospitals. About 90 percent of all dancers are women, but in some types of dance, particularly ballet and modern, women constitute only about one half of the performers.

Dancing teachers are located chiefly in large cities, but many smaller cities and towns have schools of the dance. New York City is the hub for the majority of performing dancers; others are situated in most large cities.

Professional training in ballet typically takes from ten to twelve lessons a week for the eleven or twelve months in the year and many additional hours of practice. The length of the training period depends on the student's ability and physical development, but most dancers have their professional audition by age 17 or 18.

Because of the strenuous training in professional schools, a student's general education may not exceed the legal minimum. However, a dancer's education should include a study of music, literature, and history to help in the interpretation of dramatic episodes and music.

About 200 colleges and universities confer bachelor's degrees on students who have majored in physical education and concentrated on dance; majored in a dance; or majored in a dance program to prepare students as professional dance artists. Some schools also give graduate degrees.

A college education is an advantage in obtaining employment as a teacher of professional dancing or choreography. However, dancers who postpone their first audition for openings in classical ballet until graduation may compete at a disadvantage with younger dancers.

Professional schools usually require teachers to have experience as a performer; college and conservatories generally require graduate degrees, but experience as a performer often may be substituted. Maturity and a broad educational background also are important.

The dancer's life is one of rigorous practice and self-discipline. Good health and physical stamina are necessary, both to keep in good condition and to follow the rugged travel schedule imposed on many dancers. Height and body build should not vary much from the average. Good feet and normal arches are also required. Above all, one must have a natural aptitude for dancing, and a creative ability to express oneself through dance.

Seldom does a dancer perform unaccompanied. Therefore, young persons who consider dancing as a career should be able to function as part of a team. They also should be prepared to face the anxiety of unstable working conditions brought on by show closings and audition failures.

Except for outstanding stars, women past thirty are rarely hired by ballet companies, and women past twenty-five are rarely hired for Broadway shows unless they have had experience in such productions. Men in ballet and men and women in modern dance can usually work longer than other dancers. After the employable age for performers has passed, some dancers teach in college or conservatories or establish their own schools. The few who become choreographers or dance directors can continue to work as long as persons in other occupations.

Dancers who perform professionally are members of one of the unions affiliated with the Associated Actors and Artists of America (AFL-CIO). Dancers who perform in opera ballet, classical ballet, and the modern dance belong to the American Guild of Musical Artists, Inc.; those who perform on life television belong to the American Federation of Television and Radio Artists; those who perform in films, television, and other forms of motion pictures belong to the Screen Actors Guild or the Screen Extras Guild; and those who appear in musical comedies join Actor's Equity Association. Dancers also may be members of other unions, depending upon the fields in which they perform. Minimum salary rates, hours of work, and other conditions of employment are specified in basic agreements signed by unions and the producers. The separate contract signed by each dancer with the producer of the show may be more favorable than the basic agreement regarding salary, hours of work, and working conditions.

The minimum salary for dancers in ballet and other stage productions was about $170 a week in 1972. The single performance rate was $68.00 for a solo dance and $37.00 per dancer for a group. Dancers on tour received an allowance of $15 a day in 1972, to defray the cost of room and board. (1) The employer pays the transportation. If a dancer signs a contract for a brief appearance in a performance on television or a few days' work in a movie, the minimum rate is higher, relative to time worked.

Some dancers qualified to teach in schools of the ballet combine this work with engagements as performers. Many more dancers have to supplement their incomes by other types of work. Salaries of teachers in the technical schools of the ballet vary with the location and prestige of the school. Dance teachers in college and universities are paid on the same basis as other faculty members. (See information under Service Cluster.)

The normal workweek is thirty hours (five hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked. Most stage performances take place in the evening, and rehearsals may require very long hours, often on weekends and holidays. When shows are on the road, weekend travel often is required.

Dancers are entitled to some paid sick leave and various health and welfare benefits provided by their unions, to which the employers contribute.

Commercial Artists. Nearly 60,000 persons, two-fifths of them women, worked as commercial artists in 1972. (1) Although some commercial artists can be found in nearly every city, the majority of work is in large cities, such as New York and Chicago, where the largest users of commercial art

are located.

Most work as staff artists for advertising agencies, commercial art studios, advertising departments of large companies, printing and publishing firms, textile companies, television and motion picture studios, department stores, and a variety of other business organizations. Many are self-employed or freelance artists. Some salaried commercial artists also do freelance work in their spare time. About 2,000 commercial artists work for federal government agencies, principally in the Defense Department. (1) A few teach in art schools.

Artistic ability and good taste are the most important qualifications for success in commercial art. However, these qualities must be developed by specialized training in the techniques of commercial and applied art. Education in the fine arts--painting, sculpture or architecture--and in academic studies generally provides a good foundation for obtaining employment in commercial art and may be essential for promotion.

The most widely accepted training for commercial art is the instruction given in art schools or institutes that specialize in commercial and applied art. To enter art school, an applicant must usually have a high school education. Some schools admit only applicants who submit acceptable work samples. The course of study, which may include some academic work, generally takes two or three years, and a certificate is awarded on graduation. A growing number of art schools, particularly those in or connected with universities, require four years or more of study and confer a bachelor's degree-commonly the Bachelor of Fine Arts (B.F.A.). In these schools, commercial art instruction is supplemented by liberal art courses, such as English and history.

The first year in art school may be devoted primarily to the study of fundamentals--perspective, design, color harmony, composition--and to the use of pencil, crayon, pen and ink, and other art media. Subsequent study, generally more specialized, includes drawing from life, advertising design, graphic design, lettering, typography, illustrations, and other courses in the student's particular field of interest. Artistic judgment, imagination, and ability to visualize ideas on paper are basic requirements for a successful career in commercial art.

The various specialities, however, differ in some of the specific abilities required. For example, letterers and retouchers must do precise and detailed work that requires excellent coordination, whereas illustrators and designers need imagination, a distinctive art style, and, in most cases, the ability to draw well. Some experience with photography, typography, and printing production is useful in art direction or design. Freelance commercial artists must sell both ideas and finished work to clients. A knowledge of type specifications and printing production methods is very helpful. A business sense and responsibility in meeting deadlines are assets, also. Art directors need a strong educational background in art and business practices and in the liberal arts. Advertising art directors require a special kind of creativity--the ability to conceive ideas that will stimulate the sale of the client's products or services.

Beginning commercial artists usually need some on-the-job training to qualify for other than strictly routine work. Advancement is based largely on the individual's artistic talent, creative ability, and education. After considerable experience, many salaried commercial artists leave to do freelance work. Most illustrators are freelancers; many of them have agents.

Commercial artists usually assemble their best art work into a portfolio. A good portfolio is essential in obtaining initial employment and freelance assignments as well as for job changes.

Freelance artists usually have irregular working hours. Salaried commercial artists generally work thirty-five to forty hours a week, but sometimes they must work additional hours and under a considerable amount of pressure to meet deadlines.

Beginning salaries for graduates with a Bachelor of Fine Arts in 1976 are somewhere between $8000 and $9000 annually. Talented artists with strong educational backgrounds and good portfolios, however, started at higher salaries. After a few years of experience, qualified artists may expect to earn between $10,000 and $15,000 or more annually. Art directors, designers, executives, well-known freelance illustrators, and others in top positions can earn somewhere between $25,000 and $30,000 a year. (3)

Interior Decorators. Approximately 18,000 persons, half of them women, worked as interior designers in 1972. (1) Additional persons worked in this field on a part-time basis. Most of these workers are employed in large cities.

Some interior designers own their own establishments either alone or as members of a designing firm. Many sell some or all of the merchandise with which they work. They may work independently or as assistants and sometimes have large staffs, including salespersons. Other interior designers work in large department or furniture stores, and a few have permanent jobs with hotel and restaurant chains. Some work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, and other manufacturers in the interior furnishing field. Interior desingers may also work for magazines that feature articles on home furnishings. Some large industrial corporations employ interior designers on a permanent basis.

Formal training is becoming increasingly important for entrance into the field of interior design. Most department stores, well established design firms, and other major employers will accept only professionally trained people for beginning jobs. In 1972 sixty-six colleges and universities offered a bachelor's degree in the field, and twenty-three had programs leading to a master's degree or a doctorate. (1) The course of study usually includes the principles of design, history or art, freehand and mechanical drawing, painting, study of the essentials of architecture relative to interiors, design of furniture and exhibitions, and study of various materials, such as woods, plastics, metals, and fabrics. Knowledge of furnishings, art pieces, and antiques is also important. In addition, courses in salesmanship, business procedures, and other subjects are valuable.

Membership in either the American Institute of Interior Designers (AID) or the National Society of Interior Designers (NSID), both professional societies, is a recognized mark of achievement in this profession. Membership usually requires the completion of three or four years of post-high school education, with the major emphasis on training in design. Another requirement is several years of practical experience in the field, including supervisory work.

After considerable experience, designers with ability may advance to design department head, interior furnishings coordinator, or other supervisory positions in the department stores or in large design firms. If they have the necessary funds, they may open their own establishments.

Artistic talent--color sense, good taste, imagination, good business judgment, and the ability to deal with people are important assets for success in the field. Also, interior designers should be able to work with detail. The satisfaction of seeing the results of one's work is one advantage of a career in interior design.

The hours of work for designers are sometimes long and irregular, for designers usually adjust their workday to suit the needs of their clients, meeting with them in the evening or on weekends when necessary.

Earnings of interior designers vary greatly depending on the parts of the country and the types of firms in which they work. Beginning salaries ranged generally from $75.00 to $100.00 a week in 1972 for art school or college graduates having formal training in interior design. (1) Although some interior designers are paid straight salaries, others receive salaries and commissions which usually range from 5 to 10 percent of the value of the sales. Still others receive commissions only, which may be as much as one-third of the value of their sales. Earnings are also relative to design ability; therefore, persons who have only average skills in this field earn only moderate incomes--from $5,000 to $10,000 a year even after many years of experience. Talented designers well-known in their locatities may earn up to $15,000 or more, and nationally recognized designers may earn over $25,000 annually. The earnings of self-employed designers vary widely depending on the volume of business, their professional prestige, the economic levels of their clients, their own business competence, and the percentage of wholesale prices they receive from the sale of furnishings. (3)

Musicians. In 1972 approximately 85,000 persons worked as performing musicians. Many thousand more taught in elementary and secondary schools and in colleges and universities. (1) Moreover, almost every town and city has at least one private music teacher.

Most professional musicians perform in cities where the nation's entertainment and recording activities are concentrated, such as New York, Los Angeles, Chicago, Nashville, Miani Beach, and New Orleans. Many perform with one of the 29 major symphonies, 80 metropolitan, or 1,100 community orchestras. Dance bands and civic orchestras also are located in many communities although in the smaller towns their members usually are part-time musicians with other regular jobs.

In addition to the people primarily employed as musicians or music teachers, thousands of qualified instrumentalists have other full-time jobs and only occasionally work as musicians. Most of these part-time musicians belong to dance bands that are hired to play at private parties or for special occasions. Others, with a background in classical music, play occasionally in orchestras, become conductors or composers, or do some part-time teaching.

Most professional musicians began studying an instrument at an early age. To achieve a career as a performer or as a music teacher, young people need intensive training--either through private study with an accomplished musician in a college or university which has a strong music program or in a conservatory of music. They need to acquire not only the great technical skill but also a thorough knowledge of music, and they must learn how to interpret music. Before a young person can qualify for advanced study in a music conservatory or in a college or university school of music, an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

More than 660 conservatories of music and college and university schools of music offer bachelor's degree programs in music education. Students who complete these programs can qualify for the teaching certificate required for elementary and secondary school positions. About four hundred conservatories and collegiate music schools accredited by the National Association of Schools of Music award the degree of bachelor of music to students who major in instrumental or vocal music. Both of these programs provide not only training in performance but also a broad background in music theory and history, together with some liberal arts courses. Advanced degrees usually are required for college teaching positions, but exceptions may be made for especially well-qualified artists.

Young persons who consider careers in music should have both musical talent and creative ability. They should also have poise and stage presence to face large audiences. Since quality of performance requires constant study and practice, self-discipline is vital. Moreover, musicians who do concert and nightclub engagements, must have physical stamina because of constant travel and rugged time schedules that often include long night hours.

Musicians customarily work at night and on weekends. They also must spend considerable time in practice and rehearsal. Many musicians, primarily those employed by symphony orchestras, work under master wage agreements, which guarantee a season's work up to fifty-two weeks. Musicians in other areas, however, may face relatively long periods of unemployment between jobs. Thus, the overall level of their earnings generally is lower than that of many other occupations. Moreover, they do not usually work steadily for one employer; consequently, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay.

Most musicians who play professionally belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American

Guild of Musical Artists, Inc. (AFL-CIO)

The amount received for a performance by either classical or popular musicians depends to a large extent on their professional reputations. Musicians who were members of one of the twenty-nine major symphony orchestras in the United States received minimum salaries that ranged from about $170 to $340 a week in 1972, according to the American Symphony Orchestra League, Inc. Seven orchestras--New York, Boston, Philadelphia, Cleveland, Cincinnati, Houston, and Chicago--have year-round seasons (fifty-two weeks) and minimum salaries ranging from $10,000 to $17,000. Musicians who played on half-hour television shows received a minimum of $72.45 in 1972. This includes two hours of rehearsal time. The minimum scale for recording is $90 for a fifteen minute tape (three hours actual taping time).(1)

The salary range of public school music teachers in Oregon for 1975-76 with a bachelor's degree was $8,300 to $9,669.(2) Many give private music lessons to supplement their earnings. However, their earnings are uncertain and vary according to the musician's reputation, the number of teachers and students in the locality, and the economic status of the community.

Singers. Opportunities for singing engagements are mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas and Chicago, the nation's chief entertainment centers. Nashville, Tennessee, a major center for country and western music, is one of the most important places for employment of singers for "live" performances and recordings. Singers who teach music in elementary and secondary schools, colleges and universities and conservatories of music are employed throughout the country. Many singers work part-time, chiefly as church singers and choir masters. Approximately 36,000 persons worked as professional singers in 1972.(1)

Young people who want to perform professionally as singers should acquire a broad background in music, including its theory and history. The ability to dance may be helpful since singers are sometimes required to dance. In addition, those interested in a singing career should start piano lessons at an early age. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. Moreover, because of the work and expense of voice training which often continues for years after the singer's professional career has started, a prospective singer must have great determination. An audition before a competent voice teacher to decide whether professional training is warranted is also important.

Young people can prepare for careers as singers of classical music by enrolling in a music conservatory or a school or department of music connected with a college or university or by taking private voice lessons. These schools provide not only voice training but include other training needed to understand and interpret music, such as music-related training in foreign languages and dramatic training. Upon completion of a four-year course of study, the graduate may be awarded either the degree of Bachelor of Music, Bachelor of Science or Arts, or Bachelor of Fine Arts.

Young singers who plan to teach music in public elementary or secondary schools need at least a bachelor's degree with a major in music education and must meet the state certification requirements for teachers. Such training is available in over 660 colleges and universities throughout the country. College teachers usually are required to have a master's degree and sometimes a doctor's degree, but exceptions may be made for especially qualified artists.

Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers. The typical popular song does not demand that the voice be developed to cover as wide a range on the musical scale as does classical music, and the lack of voice projection may be overcome by use of a microphone.

Young singers of popular songs may become known by participating in amateur and paid performances in their communities. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

In addition to musical ability, perserverence, an outstanding personality, an attractive appearance, good contacts, and good luck often are required to achieve a singing career. Singers also must have physical stamina in order to adapt to rigorous time and travel schedules. They generally work at night and on weekends. Overall, work in the entertainment field is seasonal, and few performers have steady jobs.

Except for a few well-known concert soloists, opera stars, top recording artists of popular music, and some singers regularly employed by dance bands, the motion picture industry, and commercial advertising, most professional singers experience difficulty in obtaining regular employment and have to supplement their singing incomes by doing other types of work.

Singers who appear on one-half hour television programs receive a minimum of $192 in 1972. Singers in opera choruses received between $35 and $45 per performance. (1)

The salaries of public school music teachers are determined by the salary schedule adopted for all teachers. In Oregon in 1975-76 the salary range for a beginning teacher with a bachelor's degree was $8300 to $9669.(2)

In 1972-73 full-time college and university faculty on nine-to-ten-month contracts averaged $13,813. Salaries varied, however, by teacher rank and by institutional level. Average salaries were:

Instructors	$10,662
Assistant Professors	12,046
Associate Professors	14,354
Professors	18,916 (1)

Singers who perform professionally usually belong to a branch of the AFL-CIO union, the Associated Actors and Artists of America. Singers who perform on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio or live television or who

make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and nightclub field belong to the American Guild of Variety Artists; those who sing in musical comedy and operettas belong to the Actor's Equity Association; and those who sing in the movies belong to the Screen Actors' Guild, Inc.

[2]. Projected Labor Market Needs

The employment opportunities for all of the previously described occupations are expected to change little or increase moderately through the mid-1980's. The result will be keen competition for the few new jobs and for those that are vacated by persons leaving the field.

The present overcrowding in the acting field is expected to persist. The development of motion pictures and television has greatly reduced employment opportunities for actors in the theater. Also the increasing number of American-produced films shot in foreign countries will further reduce opportunities for American actors. A third factor is the transitory nature of employment. Because of these factors, the number of job applicants will outnumber the expected employment opportunities. Even highly talented young people are likely to face keen competition and economic difficulties.

Opportunities for dancers will be limited both by the small number of full-time jobs available and the relatively large supply of applicants. The irregular nature of employment is expected to persist despite recent union-management steps to guarantee full or near full employment each year. However, dancers who have the personal and educational qualifications for teaching will have more opportunities for employment than those trained only as performers, for the growing interest in dance as one of the fine arts is contributing to the demand for teachers of dancing.

Employment of interior designers is expected to increase moderately through the mid-1980's; however, persons seeking beginning jobs in this field probably will face competition. Interior designing is a competitive field that requires talent, training, and business ability, and many applicants vie for the better jobs. Talented art school or college graduates who major in interior design will find good opportunity for employment. Those will less talent or without formal training will find entering this field increasingly difficult.

Talented and well-trained commercial artists are expected to have favorable opportunities for employment and advancement in most kinds of work through the mid-1980's due to moderate employment growth. However, young people with only average ability and little specialized training probably will encounter competition for beginning jobs and have limited opportunity for advancement. Actually, the demand for commercial artists is expected to vary by specialization. For example, the demand for paste-up and mechanical artists is expected to increase slightly; jobs for designers, art directors, and layout men will be fewer, much sought after, and open only to experienced, talented, and creative artists.

The music performance field is expected to remain overcrowded through the mid-1980's. Competition usually is keen for positions which afford some stability of employment such as jobs with major orchestras and teaching positions in conservatories and colleges and universities and public schools. Employment of music performers is expected, though, to increase slightly. There has been a small but steady increase in the number of civic orchestras in the smaller communities.

The employment outlook for singers is also expected to remain highly competitive through the mid-1980's, especially among popular singers. Many short-term jobs are expected in the opera and concert stage, movies, theater, nightclubs, radio and television, dance bands, and other areas--but not enough to provide steady employment for all qualified singers. Singers who can meet state certification requirements may find positions as music teachers. There is expected to be a moderate increase in the demand for singers who record popular music and do commercials for both radio and television advertising.

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g. Food Services

[1] Description

Career opportunities in the food service field are expected to grow moderately through the mid-1980's. The rate of growth in employment opportunities depends upon the population growth and increased spending for food and beverages outside the home. Higher average incomes and more leisure time will allow people to eat out more often, causing increasing career opportunities.(1)

Food service personnel are employed in the field of providing customers with prepared food that is ready to be eaten. The working conditions, skills needed, and number of people employed varies a great deal geographically and seasonally.

Most food service careers that we are familiar with require less than a bachelor's degree for job entry. Following is a partial list of careers in food services requiring a bachelor's degree or more that a student may enter:(2)

Food Scientist	Quality Control
Dietician	Food Inspector
Marketing	Agricultural Commodities Inspector
Personnel	Accounting
Community Relations	Food Services Teacher

Restaurant/Cafeteria Manager

Most food service personnel are employed in the larger metropolitan areas. This is because of the greater number of large restaurants, bars, hospitals, schools, institutions, and industrial facilities that provide these services. Nearly every community provides some opportunities for food service personnel in schools, hospitals, and restaurants.(1)

Preparation for these careers can be obtained at many colleges and universities by obtaining the appropriate bachelor's degree. Many institutions have a campus food service program, and working in these programs provides valuable experience if one is planning a career in food services.(3)

The choice of the career one wishes in the food service industry will determine the degree one wishes to attain. Degrees in business programs are proposed for careers in marketing, personnel, accounting, and management. Degrees in biological sciences and chemistry may lead to a career as a food scientist, dietician, quality control, or food inspector. In addition to the general degrees, many schools offer degrees in the professional schools for dieticians, food scientists, and business managers.(3)

Working conditions and hours vary with each of the careers. Personnel in the marketing, personnel, teaching, accounting, and similar careers usually work regular hours. Personnel working with the customers or product are usually not able to limit their hours to the traditional eight-to-five day. For this reason, dieticians, community relations representatives, managers, quality control supervisors, and inspectors often work irregular hours.

Salaries of managerial workers and professionals differ widely because of differences in duties and responsibilities. Many graduates with specialized training received starting salaries ranging from $9,000 to $11,000 annually in 1972.(1) Bachelor's degree graduates with no specialized training received slightly less, and those with training and advanced degrees received more. Most experienced managers in the larger metropolitan areas earned between $12,000 and $25,000 a year in 1972.(1)

In addition to these opportunities in private enterprise, many positions in public institutions, regulatory agencies, and trade associations are available for graduates to pursue.(4)

[2] Projected Labor Market Needs

Three factors will contribute to an increased demand for food service personnel: population growth, increased earnings, and more leisure time. As our work week is shortened and increased leisure time is made available to the population, we dine out more often.

The fast food service and canteen industry has provided for recent expansion in the industry, but now the demand for bachelor's degree candidates is coming from cafeterias. Both public institutions and private industries are involved in hiring college-trained managers for their food service programs.

As in most other industries, jobs are also created by the openings created through retirement, death, or leaving the field for other careers.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.
2. U.S. Department of Labor. Dictionary of Occupational Titles. Washington: GPO, 1965.
3. Washington State University Catalog, 1975-76.
4. Information obtained in correspondence with Mrs. Evelyn Racine, FEAST Instructor, Forest Grove High School, Forest Grove, Oregon.

h. Forest Products

[1] Description

Forests are a vital resource which, if properly managed, can be used repeatedly without being destroyed. The condition of our environment has become a major concern, and foresters play a great role in protecting that environment by insuring that our forests are properly used. They manage, develop, and protect these lands and their resources: timber, water, wildlife, forage, and recreational areas.

The following is a partial list of careers in forestry requiring a bachelor's degree or more:

Forester	Forestry Teacher
District Ranger	Forest Management

Foresters estimate the amount and value of forest resources. They plan and supervise the cutting and planting of trees; the sales of trees and timber; and the processing, marketing, and use of forest products. Foresters also determine the location and type of recreation allowed in the forest. They protect the forests and their resources from fire, harmful animals and insects, and diseases. Other duties include wildlife protection, erosion control, and the supervision of camps, parks and grazing lands.

Foresters also do research, provide forestry information to forest owners and to the general public, and teach at colleges and universities. They usually specialize in one area of work, such as timber management, outdoor recreation, or forest economics. Some of these areas are recognized as distinct professions.

About 22,000 persons, most of them men, worked as foresters in 1972. One-third worked in private industry, mainly for pulp and paper, lumber, logging, and milling companies. About one-fourth worked for the federal government, primarily in the U.S. Forest Service or the Department of Agriculture, although some worked for the Department of Interior and Defense. The remainder worked for state and local governments, colleges and universities, or consulting firms, or were self-employed, either as consultants or forest owners.

A bachelor's degree with a major in forestry is the minimum educational requirement for those desiring professional careers in forestry. An advanced degree is usually required for teaching and research positions.

Education in forestry leading to a bachelor's degree or higher was offered in 1972 by fifty-one colleges and universities, of which thirty-nine were accredited by the Society of American Foresters. Curriculums stress the liberal arts as well as the technical forestry subjects, since communications skills and the appreciation of American culture are important to the forester. Specialized forestry courses range from forest ecology (structure of, and interrelationships in the forest community) to forest administration. Many colleges require students to spend one summer in a

field camp operated by the college and encourage summer jobs that give first-hand experience in forest or conservation work.

Forestry graduates often work under the supervision of experienced foresters before advancing to more responsible positions in forest management or research.

Foresters must have enthusiasm for outdoor work and be physically hardy and willing to work in remote areas. Forestry work makes both intellectual and physical demands.

Foresters earn high salaries compared to the average for nonsupervisory workers in private industry, except farming. In the federal government in early 1973, beginning foresters with a bachelor's degree could start at either $7,694 or $9,520 a year, depending on their academic record. Those having one or two years of graduate work could begin at $9,520 or $11,614; persons having a Ph.D. could start at either $13,996 or $16,682 a year. District rangers employed by the federal government in 1972 generally earned between $11,614 and $16,682 annually. Foresters at top level positions earned considerably more.(1)

Beginning salaries of foresters employed by state governments vary widely, but, with a few exceptions, tend to be lower than federal salaries. Entrance salaries in private industry, according to limited data, are comparable to federal salary levels.

Forestry teachers are paid the same as other faculty members. Forestry professors may add to their regular salaries with income from part-time consulting and lecturing and the writing of books and articles.

The forester--especially in the beginning jobs--spends considerable time outdoors in all kinds of weather. Foresters may also work extra hours on emergency duty such as firefighting.

[2] Projected Labor Market Needs

Requirements for foresters are expected to increase moderately through the mid-1980's. However, the number of new graduates with degrees in forestry could exceed job openings if current trends in forestry education continue, resulting in keen job competition.

The demand for foresters is expected to rise as the country's growing population and rising living standards increase the demand for forest products and the use of forests for recreational purposes. Employment also may increase as we become more aware of the need to conserve and to improve environmental quality.

Private owners of timberland are expected to employ more foresters as they recognize the need for and the higher profitability of improved forestry and logging practices. The forest products industries also will require additional foresters to apply new techniques for using the entire forest crop, to develop methods of growing superior trees in a shorter period of time, and to do research in the fields of plant genetics and fertilization.

Employment opportunities for foresters in the federal government probably will not increase significantly because of the changing nature of the forester's duties. Specialized scientists--hydrologists, landscape architects, civil engineers, etc.--will increasingly perform the more scientific work formerly done by the forester. Aides and technicians increasingly may perform some of the routine tasks previously done by foresters, who will be more concerned with the overall administration and coordination of work done by specialists and aides.

On the other hand, state government agencies will probably continue to hire foresters. Forest fire control, insect and disease protection, technical assistance to owners of forest lands and other federal-state cooperative programs are usually channeled through state forestry organizations. A growing demand for recreation in forest lands may result in the expansion of state parks and other recreational areas.

College teaching and research in areas such as forest genetics and forest disease also may provide employment opportunities for foresters with graduate degrees.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.

i. Health Occupations

[1] Description

Career opportunities in the health field are expected to grow very rapidly through the mid-1980's, although the rates of growth will differ considerably among individual health occupations. Those entering the health field will find that it is very competitive. Only the most qualified are accepted into medical and dental schools since these schools selectively limit enrollment. Some who are not accepted find employment in the technical health occupations such as dental technicians or inhalation therapist.

Medical personnel provide services; these services depend not only on the number of people employed in health occupations, but also on their geographic distribution. Numbers employed have grown very rapidly in recent years. How to improve their distribution remains a problem which is being attacked on the national, state and local levels.

The following is a partial list of careers in health requiring a bachelor's degree or more:

Pharmacist
Nurse, Professional
Dentist
Oral Surgeon
Orthodontist
Psychiatrist
Optometrist
Podiatrist
Audiologist
Veterinarian
Physician
Osteopathic Physician
Surgeon
Obstetrician
Biochemist
Biophysicist
Geneticist
Microbiologist
Medical Physiologist
Pathologist
Hospital Superintendent
Public Health Educator
Community Services and
Health Education Officer
Public Health Service Officer

Colleges, universities, and hospitals employ researchers such as biochemists and geneticists. Hospitals employ about half of all workers in the health field. Others work in clinics, laboratories, pharmacies, nursing homes, public health agencies, mental health agencies, private offices, and patients' homes. Health workers are employed mainly in the more heavily populated and prosperous areas of the nation.

The educational training for health occupations requiring a baccalaureate or more may be started at many two-year or four-year institutions. Some occupations in health such as a physician or dentist require considerable training beyond the baccalaureate at an approved medical or dental school.

A license to practice dentistry is required in all states and the District of Columbia. To qualify for a license, a candidate must be a graduate of an approved dental school and pass a state board examination.

Competition is keen for admittance to dental schools. In selecting students, schools give considerable weight to college grades and amount of college education. In addition, all dental schools participate in a nationwide admission testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many state-supported dental schools also give preference to residents of their particular states.

In 1972 there were 110 approved schools in the United States at which students could begin the study of medicine. One hundred seven offered the degree of Doctor of Medicine, M.D., to those who completed the course. Most medical schools require applicants to have completed at least three years of college education; some require four years. Most students entering medical schools have bachelor's degrees.

All states and the District of Columbia require a license to practice medicine. To qualify for a license, a candidate must be a graduate of an approved medical school, pass a licensing examination and, in many states, serve a one-year hospital internship. Several states require candidates to pass a special examination in the basic sciences to become eligible for the licensing examination.

Working conditions for medical employees vary considerably. While dentists usually enjoy somewhat regular hours, physicians and veterinarians may have long days and irregular hours. Veterinarians may also be exposed to danger of physical injury, disease, and infection. Many health personnel, as they grow older, may find it advantageous to accept fewer new patients and work fewer hours. Although most health occupations' duties are performed in clean offices or rooms, veterinarians often work in the field, and physicians are sometimes called to aid in emergencies such as traffic accidents and large disasters.

Persons interested in a career in medicine should have demonstrated an intellectual ability at the college and university level; an interest in scientific fields as demonstrated by reading habits, club membership and hobbies; and an interest in the health and welfare of people. Medical personnel need some finger dexterity for administering injections and performing autopsies; they also need stamina to work long and irregular hours when required.

Earnings of health workers range from the highest paid occupation, specialization, to the beginning health teacher who would earn approximately $9200 per year. The average salary for an optometrist is approximately $13,000 annually; however, new graduates or salaried persons usually earn between $10,000 and $15,000. In their own practice, optometrists start very low at first, but later, after some experience, they are able to earn $15,000 to $30,000 a year. The average salary for a dentist in Oregon is $28,000. Salaries for podiatrists range from $6,000 to $45,000 annually. Ophthalmologists find that usually their first year earnings are low, but after their practices have been established, they averaged from $25,000 to $50,000 a year. Salaries for chiropractors start at approximately $10,000 and with experience may average $24,000 to $28,000 annually. The annual salary range

of a registered nurse is $6,000 to $12,000. The average net income for physicians for the Pacific Coast area is around $44,000 a year, yet the starting salary is usually closer to $12,000. Earnings vary and depend on factors such as experience, skill, professional reputation, patient's income office expenses and overhead, and physicians in private practice generally earn more than salaried physicians and specialists. The entry salary range for a pharmacist is from $850 to $1000 a month, while union pharmacists make $9.00 an hour. In comparison, people in health occupations that require graduation from college earn from one-and-one-half times to twice the average for nonsupervisory workers in private industry, except farming. Among the occupations for which average yearly earnings are reported, the top fifteen include eight of the professional health occupations, including six medical practitioners.(1)

[2] Projected Labor Market Needs

Among the factors that are expected to contribute to an increase in the demand for health care are population growth coupled with increasing health consciousness and rising standards of living. Expansion of coverage under payment programs that make it easier for persons to pay for hospitalization and medical care also will cause growth in the health service occupations. Other openings will be created each year by the increasing expenditures by federal, state and local governments for health care and services. In addition to jobs created by employment growth, many new workers will be needed each year to replace those who retire, die, or leave the field for other reasons.

Recent expansion of training programs in most of the occupations will add to the supply of trained health personnel. The employment outlook in the various occupations ranges from excellent to possibly competitive, depending on the balance between supply of workers and expected openings.

REFERENCE

1. Information obtained in correspondence with University of Oregon Medical School, 1 April 1976.

j. Hospitality and Recreation

(1). Description

The U.S. Office of Education has created a cluster comprised of careers involved in leisure time services and labeled it "Hospitality and Recreation." The following is a list of key occupations in this cluster that may require a baccalaureate degree or higher.

Theater Manager	Cabin Attendants
Hotel Manager	Museum Curator
Recreation Director	Recreation Specialist
Reservation Agent	Administrative Staff Person (2)

Many of these occupations are located in large metropolitan centers; opportunities in rural areas are more limited. Within the hospitality and recreation industry opportunities can be found in almost any part of the country. Large companies hire staff to plan and develop recreational activities for their employees; convention complexes in the large cities provide many opportunities; and privately owned resorts in remote areas provide unlimited opportunities for trained person wishing to avoid the busy metropolitan life. In addition to the opportunities in private industry, many government or public employment opportunities exist in the park system and other agencies.

Prospective employees are often able to select geographic locations and/or employment by a private company or a public agency. Also, hospitality and recreation provide so many variations of services that one can often find a position which is his desired combination of activities.

Some colleges and universities offer specific professional degree programs in recreation management, hotel/motel management, recreation activities director, community recreation, and other related specialities.(3,4) A person who has a degree in business or liberal arts education and who likes working with people would find occupations in this cluster enjoyable.(5) In addition, some of the large hotel, motel, and resort companies have their own training programs for new employees and provide in-service training for current staff.(6)

Working conditions vary from season to season within a given facility and even more from area to area. Some resorts offer skiing in the winter and horseback riding and fishing in the summer; others cater to young people during one season and senior citizens during another. The conditions also vary between convention complexes in cities and remote resorts.

The conditions common to the hospitality and recreation industry are working irregular hours and working with people.

Earnings vary as much as working conditions in the industry; however, a notable common factor is that beginning earnings are low. Often the low pay may be overlooked by staff members who are receiving fringe benefits including room and board, meals while on shift, reduced transportation fares, etc.(7) In government service, the top salary for recreation

directors was $20,000 in 1972.(1)

(2). Projected Labor Market Needs

The hospitality and recreation industry is growing rapidly, and employment opportunities will remain favorable through the 1980's as incomes and leisure time continue to increase.(1) Also increased participation in sports, hobbies, arts and assorted other recreational activities will require additional trained counselors, specialists, directors, managers, and assorted other personnel.

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1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin, 1785, 1975.
2. U.S. Department of Labor. Dictionary of Occupational Titles. Washington: GPO, 1965.
3. Washington State University Catalog, 1974-75.
4. Oregon State University Catalog, 1974.
5. Careers in Camping. Martinsville, Indiana: American Camping Association, Inc.
6. Annual Report-1974. Holiday Inns, Inc. Memphis, Tennessee.
7. Your Career in the Hotel-Motel Industry. New York, New York: Educational Institute of the American Hotel-Motel Association.

k. Industrial Mechanics

[1] Description

With over one million members, engineering is the second largest professional occupation, exceeded only by teachers. For men it is the largest profession. Most engineers specialize in one of the many branches of the profession, and more than fourteen engineering specialities are recognized by professional societies. Besides the major branches, engineering has over eighty-five subdivisions. Engineers may specialize in the engineering problems of one industry or in a particular field of technology such as propulsion.

Since basic knowledge is required for all areas of engineering, it is possible for engineers to shift from one field of specialization to another, particularly early in their careers. Besides these common areas of basic knowledge and methods, inter-disciplinary programs both within engineering science and other specialities are increasing in popularity. Therefore, persons considering engineering as a career should become familiar with the general nature of engineering as well as with its various branches.

Engineers within the Industrial Mechanics Cluster design and develop industrial machinery and equipment needed to manufacture goods; heating, air-conditioning and ventilation equipment for more comfortable living; scientific equipment to probe outer space and the ocean depths; consumer products such as automobiles, television sets, and refrigerators; and systems for control and automation of manufacturing, business, and management process.

The following is a partial list of careers in the Industrial Mechanics Cluster requiring a bachelor's degree or more.

Mechanical Engineer	Aeronautical Engineer
Automotive Engineer	Industrial Engineer
Industrial-Power Engineer	Nuclear Engineer
Hydraulic Engineer	Marine Engineer
Environmental and Sanitary Engineer	Refrigeration Engineer
	Tool Planning Engineer
Air-Conditioning Engineer	Agricultural Engineer

About one million people worked as engineers in 1972; approximately one percent were women. More than half work in manufacturing--mostly in electrical equipment, aircraft and parts, machinery, chemicals, ordinance, instruments, primary metals, fabricated metal products, and motor vehicles industry. Over 325,000 were employed in nonmanufacturing industries in 1972, including construction, public utilities, engineering and architectural services, and business and management consulting services.

Federal, state and local governments employed more than 150,000 engineers. Over half worked for the federal government; many were employed by the Departments of Defense, Interior, Agriculture and Transportation, and the National Aeronautics and Space Administration. Most engineers in state and local government agencies worked in highway and public works departments.

Colleges and universities employed almost 45,000 engineers in research and teaching jobs, and a small number worked for non-profit research organizations.

Engineers are employed in every state, in small and large cities and in rural areas. However, about two-thirds of all engineers in private industry are employed in ten states, and of those, almost one-third are in California, New York, and Pennsylvania.

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates trained in one of the natural sciences or mathematics also may qualify for some beginning jobs.

Graduate training is being emphasized for an increasing number of jobs; it is essential for most beginning teaching and research positions and desirable for advancement. Some specialities such as nuclear engineering generally are taught only at the graduate level.

About 280 colleges, universities, and engineering schools offer a bachelor's degree in engineering. Although most schools offer the larger branches of engineering, some specialities are taught in very few institutions. Students desiring specialized training should be familiar with various curriculums before selecting a college. Undergraduate engineering schools require high school courses in mathematics and the physical sciences, and the quality of the student's high school work is important in gaining admission.

In a typical four year curriculum, the first two years are spent on basic sciences including mathematics, physics, and chemistry, and the humanities and social sciences. The last two years are devoted to engineering with emphasis on a specialty. Some programs offer a general engineering education, and the student selects a specialty in graduate school or acquires one on the job.

Some engineering curriculums require more than four years to complete. Although the number of colleges and universities having five year programs that lead to the bachelor's degree is decreasing, several now offer five year master's degree programs. In addition, several engineering schools now have formal arrangements with liberal arts colleges whereby a student spends three years in liberal arts and two years in engineering and receives a bachelor's degree from each. These programs offer students diversification in their studies.

All fifty states and the District of Columbia require licensing for engineers whose work may affect life, health, or property, or who offer their services to the public. In 1972, about 325,000 engineers were registered under these laws. Generally, registration requirements include graduation from an accredited engineering school plus four years of experience and the passing of a state examination.

Engineers should be able to work as part of a team, be creative and have

initiative, an analytical mind, a capacity for detail, and the ability to make decisions. They should be able to express their ideas to specialists in other areas such as marketing and production planning. Because of rapidly changing technologies, engineers must be willing to continue their education throughout their career.

Engineering graduates usually begin work as assistants to experienced engineers. Many companies have special programs to acquaint new engineers with special industrial practices and to determine the specialties for which they are best suited. Experienced engineers may advance to positions of greater responsibility; those with proven ability often become administrators; and increasingly large numbers are being promoted to top executive jobs. Some engineers obtain graduate degrees in business administration to improve their advancement opportunities; others obtain law degrees and become patent attorneys.

Engineers generally work under quiet conditions in modern offices and research laboratories. Some, however, may be involved in more active work--in mines, at construction or missile sites, or in some other outdoor location.

New engineering graduates with a bachelor's degree and no experience had average starting annual salaries of $10,700 in private industry in 1972, according to the College Placement Council. Master's degree graduates with no experience averaged almost $12,300 a year; Ph.D. graduates averaged about $16,400. Starting salaries for those with bachelor's degree vary by branch as shown in the accompanying table:

Starting salaries for engineers, by branch, 1971-72

Branch	Average starting salaries
Aeronautical engineering	$10,600
Industrial engineering	10,500
Mechanical engineering	10,600

In the federal government of early 1973, engineers with a bachelor's degree and no experience could start at $7,694 or $9,520 a year, depending on their college records. Beginning engineers with a bachelor's degree and one or two years of graduate work could start at $9,520 or $11,614. Those having a Ph.D. degree could begin at $13,996 or $16,682.

In colleges and universities, engineers with Ph.D. degrees started in 1972 at about $12,500 a year as assistant professors for a nine to ten month academic year.

Most engineers can expect an increase in earnings as they gain experience. Average salaries of experienced engineers are about twice those of nonsupervisory workers in private industry, except farming.

According to an Engineering Manpower Commission Survey, the average salary for engineers with twenty-one to twenty-three years of experience

was $19,600 in 1972. Some in top-level executive positions had much higher earnings.

[2] Projected Labor Market Needs

Employment opportunities for engineers are expected to be favorable through the mid-1980's. Engineering has been one of the fastest-growing occupations over the past two decades, and opportunities for engineers are expected to increase very rapidly through the mid-1980's though at a slower rate than during the past. Demand probably will be strong for new graduates with knowledge of recent techniques, including computer applications, and for engineers who can apply engineering principles to medicine, biology, and other sciences.

Opportunities for engineers are related to population growth and to industrial expansion necessary to meet the demand for more goods and services. In addition, more engineering time is required to develop complex industrial products and processes and to increase industrial automation. Public emphasis on solving domestic problems such as environmental pollution, urban redevelopment, and new sources of power should also create additional job opportunities.

The level of defense spending, general business conditions, shifting national priorities, and non-defense related federal programs and policies influence the demand for engineers. Consequently, employment opportunities fluctuate periodically. Besides filling new jobs, thousands of engineers will have to be trained to replace those who transfer to other occupations, retire, or die.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.

1. Marine Science

[1] Description

Oceanography is the application of several branches of science to a study of the oceans. It is an environmental science concerned with all processes in the ocean--biological, physical, chemical, and geological--as well as the interactions between the ocean and the atmosphere. Some studies are so complex that they require a team of scientists representing several specialities. Many years of intensive individual or group research are frequently needed to understand the functions of the sea.

Oceanographers use the principles and techniques of natural science, mathematics, and engineering to study oceans--their movements, physical properties, and plant and animal life. Their research not only extends basic scientific knowledge, but also helps develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving national defense.

Oceanography is generally subdivided into special fields or disciplines and programs which are integrated and overlapping.

Biological oceanography deals with marine ecology and the behavior of marine organisms. The organisms range from microscopic, unicellular phytoplankton to the largest of all living organisms, the blue whale. Biological oceanographers search for ways to extract drugs from seaweeds or sponges and determine the effects of radioactivity and pollution on the growth of fish.

Physical oceanography includes the study of the physical property of the oceans. Physical oceanographers study the density and temperature of sea water, the mixing of different water types, transmission of light and sound, currents, waves, tides, and the interaction of the ocean with the atmosphere. Their research on the relationships between the sea and the atmosphere may lead to control over the weather.

Chemical oceanography investigates the complex chemical makeup of sea-water and the chemical reactions that take place in the oceans. Chemical and biological oceanographers both may study the behavior of radioactive nuclides as they pass through the food web. The chemistry of marine pollution as well as the extraction of useful materials from sea-water are also included in chemical oceanography. The removal of salt from sea water for drinking purposes is one practical area of study.

Geological oceanographers study the shape of ocean basics, the boundary between ocean and land, sea floor sediments, and the gravity field over the ocean. Marine geologists and geophysicists may also study important mineral deposits on the sea floor as well as oil and gas under the sea.

Ocean engineering and electronic specialists refer to the design and construction of systems, structures, devices, and instruments used in oceanographic research and in general ocean use. They may also lay cables, supervise underwater construction and locate sunken ships to recover their cargoes.

Marine resource management deals with planning and management. The social, economic, political, legal, and cultural implications as well as the scientific basis for management and planning are considered. This program is not designed to train research scientists and engineers.

The following is a partial list of careers in the marine science cluster which require or recommend a bachelor's degree or more.

Marine Biologist	Chemical Oceanographer
Biological Oceanographer	Marine Geologist
Physicist	Geological Oceanographer
Physical Oceanographer	Geophysicist
Electronic Specialists	Oceanographic Engineer

Approximately 4,500 people, about 5 percent are women, worked as oceanographers in 1972. About one-third in private industry, one-fourth for the federal government, and the remaining for local governments. They are involved in teaching, researching, and consulting. Several branches of the federal government now employ oceanographers: Navy, Coast Guard, Department of Interior, U.S. Geological Survey, National Oceanographic and Atmospheric Administration (NOAA), the Atomic Energy Commission, and the Environmental Protection Agency. Some oceanographers may work for firms designing and developing instruments and vehicles for oceanographic research. Others might work for fishery laboratories of state and local governments.

The minimum requirement for beginning professional jobs in oceanography is a bachelor's degree with a major in oceanography, biology, earth or physical sciences, mathematics, or engineering. Professional jobs in research, teaching and high-level positions in most other types of work require graduate training in oceanography or a basic science.

All oceanographers must complete at least one year each of college physics, chemistry, and calculus. A good background in technical writing is also recommended since oceanographers must write reports and papers for publication. Courses in computer programming and statistics are frequently useful for oceanographers in all fields. In general, students should specialize in the particular science that is closest to their area of oceanographic interest. For example, students interested in biological oceanography could obtain a bachelor's degree in some aspect of biology. Those interested in geological oceanography should get a degree in geology. An undergraduate degree in physics, mathematics, meteorology, or some combination of these is needed for physical oceanography. For chemical oceanography one needs an undergraduate degree in chemistry.

Only forty-six colleges and universities offered undergraduate degrees in oceanography or marine sciences in the early 1970's. However, since oceanography is an interdisciplinary science, training in a basic science and a strong interest in oceanography may be adequate preparation for some beginning jobs or for entry to graduate school.

Competition for acceptance into a graduate oceanography program is exceptionally keen. Most graduate schools in oceanography are already overcrowded.

There are many more than there are spaces available. Acceptance at most schools is generally based on under-graduate records, letters of recommendation, and graduate record examination scores. Generally, an undergraduate gradepoint of 3.0 is the minimum accepted.

The basic qualifications for oceanographers are about the same as for most scientists: an analytical and inquisitive mind with above-average ability, and an interest in science and mathematics. The independent and group work necessary requires patience, perserverance, ambition, extreme care, and accuracy. Work at sea requires agility, alertness, excellent health, and stamina.

Working conditions for oceanographers vary from laboratory work on land to long periods of time on board ship. There might be occasions when an oceanographer will spend time on an ice island or ice floe. Sometimes the hours may be long and arduous. Quarters can be small and cramped.

Although some of the most exciting discoveries are made at sea, much land-based research and study are required. When an expedition returns to port, the date and samples must be processed and analyzed. Scientific papers and reports must be written. Research proposals must be written to obtain funds to continue research efforts. Laboratory work may involve use of complex specialized equipment as well as data processing by high speed computers. Due to the greater emphasis that has been placed on oceanography in the past several years, most land laboratories are quite modern.

Oceanographers have relatively high earnings. In early 1973, oceanographers in the federal government with the bachelor's degree received starting salaries of $7619 or 9520 a year, depending on their college grades. Those with the master's degree could start at $11,614 or $13,996; and those with the Ph.D. degree at $13,996 or $16,682. In private industry new graduates with the bachelor's degree received average starting salaries of $9000 a year, according to the American Geological Institute. Those with the master's degree could start at $11,000; and those with the Ph.D. at $13,000. (1)

[2] Projected Labor Market Needs

The job outlook for oceanographers is varied, depending on the education the oceanographer has. Those with a Ph.D. are likely to find the job prospects favorable through the 1980's. People with less education may face competition for beginning jobs and find other opportunities limited to doing routine analytical work as research assistants.

If government and industry continue to invest in ocean work at the present rate, the profession will face a slow growth rather than the rapid expansion predicted by some. Even though demand could double in a few years, the universities are already producing enough to easily meet the demand.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.

m. Marketing

[1] Description

Career opportunities in the marketing cluster are centered around the world of business, whether it be banking, insurance, sales, personnel, etc. Marketing is generally defined as the performance of business activities carried out to direct and facilitate the handling and movement of goods and services from producers to household and industrial consumers. This includes those activities necessary for the interpretation of consumer needs, the resulting product planning, and the marketing strategy and management necessary to effectively carry out those business activities.

The following is a partial list of careers in the marketing cluster which require or recommend a bachelor's degree or more:

Stockbroker
Bank Officer
Market Research Specialist
Account Executive
Market Research Analyst
Trust Officer
Business Executive
Junior Executive
Business Manager
Executive Trainee
College Professor of Business
Secondary School Business Teacher
Buyer
Manpower Planning Specialist
Real Estate Analyst
Personnel Worker
Manufacturers' Salesperson

In some instances a bachelor's degree is not a requirement; however, it would enhance one's opportunity to procure employment and improve one's performance. For example, to become an executive trainee, a bachelor's degree would be an asset, but some companies might not require that a trainee have the degree. In other cases the bachelor's degree is a must. A college professor, for example, must have at least a bachelor's degree to teach in the business school.

Business opportunities in the marketing cluster exist throughout the United States. Furthermore, the need for workers in the banking, insurance, and sales business will continue as long as people conduct the business of buying and selling. Workers in the marketing cluster are employed by a diverse group including business firms, government agencies, schools and colleges and universities.

A person entering an occupation in the marketing cluster will have increased possibility of procuring a position if he has a bachelor's degree. For instance, in personnel work a college education is becoming increasingly important. Many employers in private industry prefer applicants who have majored in business or personnel administration; likewise governmental agencies prefer public administration, political science or personnel administration majors as applicants and employees. For some positions, salesworkers must be college graduates who have degrees in fields such as engineering. Most professional and managerial bank personnel have completed college. In some positions a master's degree is a prerequisite.

Other capabilities are necessary for persons entering the business world.

First and foremost, they must understand the needs and viewpoints of their customers and work easily with strangers. Other important attributes include self-confidence, imagination, self-discipline, energy, and the ability to communicate. Skills in arithmetic are, in many cases, an asset. Personnel in managerial positions must have planning, organizing, and directing abilities. Those in the marketing cluster must be able to work individually and with large and small groups.

Training for a career in marketing includes a bachelor's degree in business administration, personnel administration, or a liberal arts curriculum that possibly includes accounting, economics, commercial law, political science, etc. Some positions require specialized training. Drug salesworkers usually need training at a college of pharmacy. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire college-trained engineers or chemists. In fact, most beginning workers in marketing will take part in some kind of specialized training before they start on the job. An exception might be the college professor.

Workers in the marketing cluster will perform their duties normally in an office but may work on the road as salespersons or in some other meeting place with clients. Some positions require that a person work more than the normal forty-hour week or the eight-hour day. Occasionally, weekend or night work is necessary. They may also frequently work under pressures to meet deadlines.

According to a private survey conducted in 1972, large banks, insurance companies, and other financial institutions paid salaries ranging from $550 to $780 a month to new executive trainees who were college graduates. The salaries of senior bank officers may be several times greater than these starting salaries. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in large cities.

Starting salaries for market research trainees averages about $9,000 a year in 1972, according to the limited data available. Those with a master's degree in business administration and related fields usually began with annual salaries close to $13,000. Experienced marketing research workers who held management positions received higher earnings. Vice presidents of marketing and directors of marketing research often earned between $25,000 and $35,000 a year.(1)

The salary range for personnel workers is $9,500 starting to $25,000 for personnel directors.

The starting salary for inexperienced salesworkers with a bachelor's degree averaged about $9,000 a year in 1972, exclusive of commissions and bonuses. Some firms pay a straight salary; others pay a straight commission based on the dollar amount of sales. The majority, however, use a combination plan of salary and commission, salary and bonus, or salary-commission and bonus. In 1972, many experienced salesworkers earned between $16,000 and $32,000 annually.(1)

[2] Projected Labor Market Needs

Job opportunities in the marketing cluster are expected to increase considerably through the mid-1980's as businesses continue to expand and population to increase. There will also be increased opportunities because replacements will be needed for those who leave their positions because of retirement, death or other reasons.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.

n. Metals

[1] Description

Opportunities in metal careers are expected to grow moderately or rapidly, depending on the specific career.(1) The rate of growth in employment opportunities will be greatest in the engineering and research careers requiring a bachelor's degree.

The increasing complexity of industrial operations and the expansion of automated processes, along with industry growth, are factors contributing to increased requirements for these engineers.(1) Increased recognition of the importance of scientific management and safety engineering in reducing costs and increasing productivity, and newer areas of work such as air, noise, and water pollution control, should create additional employment opportunities for college graduates in metals and related careers.(3)

Most of the metals careers requiring a bachelor's degree or more education are in research, engineering, and management. Following is a partial list of these careers that a student may wish to enter:(2)

Metallurgical Engineer	Safety Engineer
Mining Engineer	Field Engineer
Geologist	Director, Quality Control
Geophysicist	Manufacturing Engineer
Mechanical Engineer	Chemist, Industrial
Plant Manager	Archeologist
Assayer	Economic Geologist

Many of these positions are available in the larger metropolitan centers where the industrial offices are located. In addition to the city offices, many opportunities exist for scientists and engineers out in the field at the mine, exploration, or factory site.

In addition to private industry, the needs of the public agencies must be emphasized. Colleges and universities for instructional staffs, environmental agencies for compliance and management, and industrial commissions all need qualified personnel for the respective functions they perform.

Preparation for these careers may be gained through physical science, environmental science, business, or engineering degrees, to name a few.(1) If interested in a civil service or private industry position, summer employment during college may assist in securing a permanent position upon graduation.

The working conditions, hours, and earnings will vary with the employment opportunity one accepts. If working in a planning and design office, the hours are regular, but geologists and exploration engineers in the field may work long hours with dirty and uncomfortable working conditions.

The earnings vary considerably with the career choice, but a few selected examples follow. Beginning engineers earn between $7694 and $16,682, depending on degrees held and on their college records. The average salary for engineers with twenty-one to twenty-three years experience was $19,600 in 1972.(1)

Geologists and geophysicists scart between $7694 and $16,682, depending on degrees held and on college records, with the beginning average in 1972 being $9000 for those with a bachelor's degree.(1)

[2] Projected Labor Market Needs

Employment opportunities are expected to be favorable through the mid-1980's in the metal careers. Engineering has been one of the fastest growing occupations over the past two decades, and opportunities for engineers are expected to increase very rapidly through the mid-1980's, though at a slower rate than during the past twenty years.(1)

The environmental sciences, including geologists and geophysicists, as they apply to the metals and related industries are expected to remain very favorable for employment opportunities.

As in the other clusters, positions become available due to promotions, retirements, and other shifts of personpower, in addition to economic growth of the industry.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.
2. U.S. Department of Labor. Dictionary of Occupational Titles. Washington: GPO, 1965.
3. Information obtained in correspondence with Kent Ashbaker, Engineer, Oregon Department of Water Quality, 14 April 1976.

o. Service Occupations

[1] Description

Occupations in the service cluster have common competencies that evolve from the nature of the tasks performed: a service to people. A prime consideration for the inclusion of an occupation in the service cluster is that the occupation should involve primarily direct contact with and service to people, not data or things.

In the service cluster the main concentration of information will be in the areas of education, law, law enforcement, and some social service occupations.

The following is a partial list of careers in the service cluster which require or recommend a bachelor's degree or more:

Elementary Teacher	Law Enforcement Officer
Secondary Teacher	Social Worker
Lawyer	Caseworker
Judge	Faculty Member
Minister	Academic Dean
Principal	Superintendent
Librarian	

Job opportunities in the service cluster will be found wherever people live. The greater the population, the greater the opportunities. Law enforcement officers are employed by states, cities, and counties. Educators are employed by city and local school districts, as well as counties, states, and private schools. Lawyers are self-employed or employed by various forms of government or by businesses. Social workers work mostly for governments--federal, state, county, or local.

Elementary and secondary teaching is the largest of the professions: about 2.7 million full-time teachers were employed in 1972-73 in the nation's elementary and secondary schools and colleges and universities. No other profession has traditionally offered women so many employment opportunities as teaching. About 1.7 million women are teachers.(1)

All fifty states and the District of Columbia require public elementary and secondary teachers to be certified. To qualify for certification, a teacher must study four years at an approved teacher education institution. In 1972, eleven(1) states required teachers to do supplementary post-graduate work--usually a master's degree or a fifth year of study--within a certain period after their initial certification. Some states require U.S. citizenship; some, an oath of allegiance; and several, a health certificate. Local school districts have additional requirements for employment.

Personal qualifications a teacher must have include a desire to work with young people, an interest in a special subject, and the ability to motivate students and relate knowledge to them. Teachers should also be dependable and have good judgment. Enthusiasm for teaching and the competence to handle classroom situations also are important.

Elementary and secondary teachers work an annual average of 180 to 190 days. Many teach summer school sessions, while others take courses for professional growth or work at other jobs during the summer months.

Laws in thirty-eight states and the District of Columbia ensure the employment of those who have achieved tenure status. Laws requiring collective bargaining of wages, hours and the terms and conditions of employment cover increasing numbers of teachers.

According to the National Education Association(NEA), public elementary teachers in 1972-73 averaged $9,823 a year. Secondary school teachers in 1972-73 averaged $10,460.(1) In Oregon in 1975-76 the average teacher's salary was $12,192.50. Salary ranges in Oregon for a beginning teacher in 1975-76 with a bachelor's degree were $8,300 to $9,669.(2)

College or University Faculty Member. College and university faculty are classified in four academic ranks: instructors, assistant professors, associate professors and full professors. To secure an initial appointment, instructors generally must have a master's degree. For advancement to higher ranks, they need further academic training plus experience. For a full professorship, the doctorate and extensive teaching experience are essential.

The working hours and environment of college teachers generally are favorable. Classrooms, office facilities, and laboratories usually are well-equipped, and teachers have access to library facilities and clerical assistance. College teachers usually have flexible teaching schedules. According to a recent survey, the under-graduate faculty in four-year colleges and universities normally taught twelve hours and usually no more than fourteen or fifteen hours a week. Graduate faculty have a teaching load of about ten hours a week. In addition to time spent in the classroom, college and university teachers devote much time to preparation and other duties. Overall, full-time faculty spend about forty hours a week on school-related activities. For faculty in junior and community colleges, the normal teaching load is slightly heavier, but the total number of hours on the job are fewer.

In 1972-73 full-time college and university faculty on nine-to-ten-month contracts averaged $13,813. Salaries varied, however, by teacher rank and by institutional level. Average salaries were:

Instructors	$10,662
Assistant Professors	12,046
Associate Professors	14,354
Professors	18,916 (1)

In general, larger institutions paid higher salaries. Salaries of teachers in four-year colleges tended to be higher than those in two-year colleges; university teachers average the highest salaries.

Lawyer. Persons wishing to practice law in the courts in any state must be admitted to its bar. Applicants for admission to the bar must pass a written examination; however, a few states drop this requirement for graduates of their own law schools. A lawyer who has been admitted to the

bar in one state, usually can be admitted in another without taking an examination, provided he meets that state's standards of good moral character and has a specified period of legal experience. Each federal court or agency establishes its own qualifications for those practicing before it.

To qualify for the bar examination in most states, an applicant must have completed at least three years of college, although an increasing number of law schools are requiring a bachelor's degree for entrance, and to have graduated from a law school approved by the American Bar Association or the proper state authorities. The required college and law school work usually takes seven years of full-time study after high school.

The practice of law involves a great deal of responsibility. Young people planning careers in law should like to work with people and ideas, and be able to win the confidence of their clients. Also, lawyers often work long hours and are under considerable pressure when a case is being tried. In addition, they must keep abreast of the latest laws and court decisions. However, since lawyers in private practice can determine their own hours and work load, many stay in practice well past the usual retirement age.

Lawyers entering practice in 1972 earned starting salaries ranging from $7,000 to $20,000 annually. Factors affecting the salaries offered to new graduates include: their academic records; types, sizes and locations of their employers; and specialization valuable to the employer. In the federal government, annual starting salaries for attorneys were $11,614 or $13,996 in early 1973 depending upon their academic and personal qualifications. Those with a few years of experience earned $14,700 a year.(1)

Law Enforcement Officer. About 370,000 full-time officers worked for local police departments in 1972. Although most were men, an increasing number of women are now being employed.

A bachelor's degree is generally not a requirement for entering the field of law enforcement, but more departments every day are requiring the bachelor's for employment.

Local civil service regulations govern the appointment of police officers in practically all large cities and in many small ones. Candidates must be United States citizens, and be able to meet certain height and weight standards. Eligibility for employment depends on one's performance on competetive examinations, as well as on education and experience. The physical examinations often include tests of strength and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police work, candidates are interviewed by a senior officer at police headquarters, and their character traits and background are investigated. In some police departments, candidates also may be interviewed by a psychiatrist or a psychologist or given a personality test. Although police officers work independently, they must perform their duties in line with laws and department rules. They should enjoy working with people and should want to serve the public.

The scheduled workweek for police officers usually is forty hours. Because police protection must be provided around the clock in all but the smallest communities, some officers are on duty over weekends, on holidays, and at night. Policemen are subject to call anytime their services are needed and may work overtime in emergencies. In some departments, overtime is paid at straight time or time and a half; in others, officers may be given an equal amount of time off on another day of the week. Policemen may have to work outdoors for long periods in all kinds of weather.

Police officers generally are covered by liberal pension plans, enabling many to retire at half pay by the time they reach age fifty-five. In addition, paid vacations, sick leave, and medical and life insurance plans frequently are provided.

The salary ranges for state, county, and local law enforcement officers are comparable. In 1975 the starting salary for an inexperienced Oregon State Police officer ranged from $856 to $896 per month, while an experienced certified trooper would earn between $1039 to $1326. During the same year, the salary range for a deputy sheriff in Multnomah County with a mandatory bachelor's degree was $1098 to $1474. For the city of Portland in 1975, a certified patrolman would earn from $1019 to $1366.(3)

Salary increases are regular for most officers during the first few years of employment until a set maximum has been reached. Also, higher basic salaries are received by those of higher rank, such as sergeants, lieutenants, and captains. The highest earnings, paid to top law enforcement officials like police chiefs or commissioners, may be as high as $40,000 annually in the largest cities.(1)

Social Worker. To enter the field of social work a bachelor's degree, preferably in social welfare or social work, generally is the minimum educational requirement for beginning jobs. In several specialized areas, a master's degree in social work is required. For teaching positions, a master's degree in social work is also required, and a doctorate is preferred. A graduate degree and experience in social work, as well as training in social science research methods, are required for research work. In most states, applicants for employment in a government agency must pass a written examination.

Social workers should be emotionally mature, objective, sensitive, and possess a basic concern for people and their social problems. They must be able to handle responsibility and work independently, form and sustain good working relationships, and encourage social adjustments in others.

Most social workers have a five-day week, but many work only part-time. In some social work agencies, however, the nature of the work requires evening and weekend work, for which social workers usually receive compensatory time off. Virtually all social work agencies provide fringe benefits such as paid vacations, sick leave, and retirement plans.

Earnings of the social worker are generally above the average of all nonsupervisory workers on private non-farm payrolls. Various state agencies paid social caseworkers with bachelor's degrees average starting salaries of about $6,900 a year, according to an early 1972 survey of selected occupations

by the Public Personnel Association. Salaries of casework supervisors in state agencies ranged from $8,800 for those having considerable experience. Salaries of psychiatric social workers averaged from $8,700 to $10,800; those of probation and parole officers ranged from about $7,800 to $9,900. Social workers employed by cities and urban counties tend to average $1,000 to $2,000 (1) more than those paid by state agencies, in many instances, according to the survey cited. Persons having master's degrees in social work received starting salaries of about $10,000 in 1972, according to a survey by the National Association of Social Workers. Those having experience earned median salaries of about $13,000. Private practitioners and those in administration, teaching, and research jobs earned more than $16,000.

Persons having a bachelor's degree in social work or three years of appropriate work experience hired by the federal government in 1972, began as social service assistants and received $7,319 a year. Master's degree graduates of accredited schools of social work started at $9,053 a year; those having professional social work experience could begin at a higher salary. Salaries of journeymen social workers employed by the federal government ranged from $13,309 to $17,305.(1)

[2] Projected Labor Market Needs

Kindergarten and elementary school teachers are expected to face competition for jobs through the mid-1980's.(1) If patterns of entry and reentry to the profession continue in line with past trends, the number of persons qualified to teach in elementary schools will exceed the number of openings. Enrollment is the basic factor underlying the need for teachers. Fewer students means fewer jobs. In 1967 the elementary enrollment peaked at thirty-two million. The U.S. Office of Education projects that by 1977 the downward enrollment trend will halt near twenty-nine million, and enrollments again will advance to nearly thirty-five million by 1985.(1) Besides new positions created by increasing enrollments, additional teachers will be needed to replace those who are not now certified; to meet the expected pressure for improved pupil-teacher ratios; and to fill positions vacated by those who retire, die, or leave the profession for other reasons. Many persons leave teaching at least temporarily to take on full-time homemaking or family responsibilities.

The supply of secondary school teachers through the mid-1980's will greatly exceed anticipated requirements if past trends of entry into the profession continue. As a result, prospective teachers are likely to face keen competition for jobs. Fewer births mean fewer students which will result in fewer teaching positions. Although the overall outlook for secondary teachers indicates a highly competitive market, employment conditions may be favorable in certain fields. A recent survey found continuing teacher shortages in mathematics, industrial arts, special education, and some vocational-technical subjects.

Entrants to college and university teaching are expected to face keen competition through the mid-1980's. Although the demand for teachers will continue to expand, the supply of new doctoral and master's degree graduates--the principal source of teaching supply--is expected to more than meet these

needs. College enrollment represents the basic factor underlying the demand for teachers. During the 1960's and early 1970's teacher employment expanded due to growth in both the number of college-age persons and the proportion of eighteen to twenty-one-year-olds enrolled in college. While the proportion attending college is expected to continue to rise, the number of college-age persons will decline after 1978, and by the early 1980's, enrollment will taper off and begin to fall. Over the 1972-85 period, the total number of college teachers needed is expected to rise only 20 percent. This compares with a more than 100 percent increase over the previous thirteen-year period.(1)

Through the mid-1980's as demand is slowing, the numbers of both master's and Ph.D. degree recipients are expected to grow rapidly. Consequently, a small proportion of each year's degree recipients will be needed for college teaching. An increasing proportion of prospective college teachers, therefore, will have to seek nonacademic jobs. Alternative opportunities will exist in government and industry, which have traditionally competed with colleges and universities for Ph.D.'s and holders of master's degrees. Also, some of those persons holding graduate degrees may find it increasingly necessary to enter occupations that have not traditionally required advanced levels of study. Secondary school teaching may provide opportunities for an increasing number of master's graduates.

The employment outlook also depends on the institutional level and on the teacher's qualifications. Although enrollments in the 1970's are expected to stabilize in four-year colleges and universities, many institutions, including junior and community colleges, may hire additional Ph.D.'s to upgrade their faculties. Master's graduates also will continue to find jobs in two-year colleges. Public institutions are expected to continue to attract an increasing proportion of total college enrollment. Thus, opportunities in public colleges will be greater than in private institutions.

Employment opportunities for police officers are expected to be favorable for qualified applicants through the mid-1980's. Police employment should rise rapidly as population and economic growth create a need for more officers to protect life and property, regulate traffic, and provide other police services. Many openings also will occur as policement retire, die, or leave their jobs for other reasons.

A rapid increase in the number of law school graduates seeking employment is expected to create keen competition for the available jobs. Graduates of well-known law schools and those who rank high in their classes should find salaried positions with law firms, on the legal staffs of corporations and government agencies, and as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings may experience some difficulty in finding salaried jobs. However, many will find opportunities in fields where legal training is an asset but not normally a requirement.

The employment of lawyers is expected to grow moderately through the mid-1980's as increased business activity and population create a demand for attorneys to deal with a growing number of legal questions. Supreme Court decisions extending the right to counsel for persons accused of lesser

crimes, the growth of legal action in the areas of consumer protection, the environment, safety, and an expected increase in the use of legal services by middle income groups through prepaid legal service programs also should provide employment opportunities. Other jobs will be created by the need to replace lawyers who retire or leave the occupation for other reasons.

Prospects for establishing a new practice probably will continue to be best in small towns and expanding suburban areas. In such communities competition is likely to be less than in big cities, and new lawyers may find it easier to become known to potential clients; also, rent and other business costs are somewhat lower. Salaried positions, on the other hand, will be limited largely to the urban areas where the chief employers of legal talent--governmental agencies, law firms, and large corporation--are concentrated.

Employment opportunities for persons having bachelor's degrees in social welfare or related fields should be favorable through the remainder of the 1970's. Competition may increase in the 1980's, however, if the number of social work graduates increases along with growth of all college graduates. The outlook for graduates of master's degree programs in social work is expected to continue to be very good through the mid-1980's. Women with social work experience should have favorable prospects for part-time work.

The very rapid growth in employment of social workers that is expected through the mid-1980's will stem primarily from anticipated expansion in programs to provide services to disadvantaged individuals and groups. The occupational structure of the economy is expected to continue to change and create severe problems for many unskilled workers and others whose jobs have been replaced by machines. In addition, social change will continue to affect family life. The increasing population of the very young and the very old, age groups most in need of social work services, also is expected to contribute to the demand for social workers.

REFERENCE

1. U.S. Department of Labor. Occupational Outlook Handbook, 1974-1975. Washington, Bulletin 1785, 1975.
2. Information obtained in correspondence with Oregon Education Association, 13 April 1976.
3. Information obtained in correspondence with Administration of Justice Department, Portland State University, 22 April 1976.

APPENDIX II

Comparison of Cluster Taxonomies

This is a comparison of three different clustering classification systms: Oregon, USOE, and CIS. With each clustering system one will find those clusters that are similar: Agriculture in Oregon, Agri-business and Natural Resources in USOE, and Agriculture and Forestry in CIS. In addition to showing clusters that are similar, an attempt has also been made to show occupations in each cluster that are similar. For instance, one will find a cattle rancher listed in Agriculture in the Oregon system, general farmer in Agri-business and Natural Resources in the USOE system and farm worker in CIS. These are all similar jobs in agriculture as identified in three different systems.

An attempt has also been made to show some clusters that are different in each system. Oregon and CIS have a Metals cluster, but USOE does not. Foundry workers are found in both Oregon and CIS Metals cluster, but to locate a foundry worker in the USOE system, one would have to look somewhere else.

The criteria for placement of occupations within a cluster varies from one cluster classification system to another and from fairly precise to quite flexible. Basically, occupations are clustered by similar educational requirements and by nature of work. Clustering facilitates the organization of occupational information for various purposes. In the United States today people work at approximately 24,000 different jobs. It is impossible to know and understand much about many jobs, but it is reasonable to know and understand something about fifteen or twenty clusters.

OREGON

I. Agriculture

1. Cash Grain Farmer
2. Cattle Rancher
3. Orchardist
4. Kennelman
5. Livestock Farmhand
6. Agronomist
7. Sprayer
8. Food and Drug Inspector
9. All-around Butcher
10. Grounds Keeper
11. Nursery Worker
12. Park Worker
13. Veterinarian
14. Farm Equipment Mechanic
15. Salesman: Farm, Garden Equipment/Supplies

USOE

I. Agri-business and Natural Resources

1. Agronomist
2. Feed and Farm Management Advisor
3. County Agricultural Agent
4. Seed Analyst
5. Veterinary Meat Inspector
6. Vegetable Grower
7. Horse Breeder
8. Cattle Rancher
9. Sheep Rancher
10. General Farmer
11. Farm-Equipment Mechanic
12. Tree Surgeon
13. Nurseryman

CIS

I. Agricultural and Forestry Occupations

1. Foresters
2. Fish and Wildlife Specialists
3. Forestry Technicians
4. Grounds Keeper and Gardner
5. Floral Designer
6. Farmer and Farm Manager
7. Farm Worker
8. Seasonal Farm Laborer

-11-

OREGON

II. Accounting

1. Controller
2. Treasurer
3. Estimator
4. Auditor
5. Accountant
6. Bookkeeper
7. Cashier
8. Payroll Clerk
9. Accounting Clerk

III. Clerical

1. Digital Computer Operator
2. Keypunch Operator
3. Programmer Business
4. Systems Analyst, Bus.-Elec.-Data Processing
5. File Clerk
6. General Office Clerk
7. Telephone Operator
8. Post Office Clerk
9. Receptionist
10. Manager, Office
11. Clerk-Typist

IV. Steno-Secretary

1. Secretary
2. Stenographer

USOE

II. Business and Office

1. Business Agent
2. Public Relations Man/Woman
3. Placement Officer
4. Personnel Clerk
5. Teacher, Secondary School (Business Subjects)
6. Bank Teller
7. Credit Clerk
8. Secretary
9. Stenographer
10. Typist
11. Clerk-Typist
12. Accountant
13. Bookkeeper I
14. Keypunch Operator
15. Clerk, General Office
16. Cashier I
17. Receptionist

CIS

II. Bookkeeping-Accounting

1. Accountant and Auditor
2. Bookkeeper
3. Loan Officer
4. Cashier and Bank Teller
5. Computer Operator
6. Keypunch Operator
7. Office Machine Operator

III. Clerical Occupations

1. Secretary
2. Stenographer
3. Clerk Typist
4. General Office Clerk
5. Teacher Aid
6. Receptionist
7. Telephone and Telegraph Operator

OREGON

V. Construction

1. Civil Engineer
2. Building Inspector
3. Cabinetmaker
4. Structural Steel Worker
5. Painter
6. Cement Mason
7. Asphalt-Paving Foreman
8. Operating Engineer
9. Carpenter
10. Bricklayer
11. Pipefitter
12. Plumber
13. Floor Layer
14. Roofer

VI. Electrical-Electronics

1. Electrical Technician
2. Electronics Assembler
3. Maintenance Electrician
4. Electrician, Construction
5. Electrical Appliance Serviceman

UOSE

III. Construction

1. Contractor
2. Carpenter
3. Draftsman, Architectural
4. Civil Engineer
5. Plumber
6. Pipefitter
7. Cement Mason
8. Bricklayer
9. Electrician
10. Painter
11. Roofer
12. Operating Engineer
13. Maintenance Man, Building

CIS

IV. Construction

1. Painter
2. Cement Mason
3. Carpenter
4. Bricklayer
5. Plumber
6. Floor Layer
7. Roofer

V. Electricity-Electronics

1. Lineman
2. Electrician and Electrical Repairer
3. Broadcast Technician
4. Electronics Assembler

VI. Building Maintenance

1. Building Maintenance Worker
2. Janitor

OREGON

VII. Food Services

1. Manager, Cafeteria
2. Hostess, Restaurant or Coffee Shop
3. Waiter, Informal
4. Cook
5. Meat Cutter
6. Kitchen Helper
7. Baker

CIS

VII. Food Service

1. Chefs and Dinner Cooks
2. Fry Cooks
3. Bartenders
4. Waiters and Waitresses
5. Flight Attendants
6. Kitchen Helpers
7. Bus Boys

VIII. Food Products

1. Bakers
2. Meat Cutters
3. Commercial Fishermen
4. Cannery Workers

OREGON

VIII. Forest Products

1. Forester
2. Bleacher Man, Pulp
3. Back Tender, Paper Machine
4. Pulp and Paper Tester
5. Fourdrinier Machine Tender
6. Chokerman
7. Chip-Mixing-Machine Operator
8. Cut-Off-Saw Operator
9. Shingle Sawyer
10. Foreman
11. Grader
12. Veneer Grader
13. Woodworking-Machine Operator
14. Box Maker, Wood
15. Plywood Patcher, Hand
16. Log-Truck Driver
17. Logging-Tractor Operator
18. Faller
19. Logger, All-Round
20. Donkey Engineer

CIS

IX. Timber Products

1. Fallers and Buckers
2. Chokersetters
3. Sawmill Log Handling Occupations
4. Plywood Log and Block Handlers
5. Veneer Production Occupations
6. Planer Mill Occupations
7. Sawmill Sawing Occupations
8. Sawmill Drying Occupations
9. Sawmill Greenchainmen
10. Lumber Graders and Inspectors
11. Sawmill Waste Recovery Occupations
12. Veneer Drying Occupations
13. Pulp and Paper Workers
14. Furniture Making Machine Operators
15. Cabinetmakers

OREGON

IX. Graphics

1. Illustrator
2. Bindery Worker
3. Off-Set Printer
4. Photographer
5. Compositor

CIS

X. Graphic Arts

1. Commercial Artists and Designers
2. Photographers
3. Printing Production Occupations

XI. Engineering and Design

1. Draftsmen
2. Interior Designers and Decorators
3. Engineers
4. Mathematicians
5. Land Use Planners
6. Architects
7. Ecologists

OREGON

X Health

1. Nurse, General Duty
2. Dental Hygienist
3. Medical-Laboratory Assistant
4. Inhalation Therapist
5. Medical Assistant
6. Occupation Therapy Aide
7. Dental Assistant
8. Nurse, Licensed Practical
9. Nurse Aide
10. Dental Laboratory Technician

USOE

IV. Health

1. Microbiologist
2. Public Health Educator
3. Surgeon
4. Physician
5. Veterinarian
6. Oral Surgeon
7. Orthodontist
8. Podiatrist
9. Occupational Therapist
10. Inhalation Therapist
11. Nurse, Professional
12. Nurse, General Duty
13. Midwife
14. Dietitian
15. Pharmacist
16. Dental Hygienist
17. Medical-Laboratory Assistant
18. Electrocardiographic Technician
19. Nuclear Medical Technologist
20. Dental Laboratory Technician

CIS

XII. Health

1. Physician
2. Dentist
3. Veterinarian
4. Optometrist
5. Dietitian
6. Physician's Assistant
7. Chiropractor
8. Pharmacist
9. Health Therapist
10. Registered Nurse
11. Licensed Practical Nurse
12. Nurse Aide and Orderly
13. Dental Hygienist
14. Dental Assistant
15. Mortician
16. Barber
17. Cosmetologist

OREGON

XI Industrial Mechanics

1. Automobile Mechanic
2. Construction-Equipment Mechanic
3. Motorcycle Repairman (All Small Engines)
4. Aircraft-and-Engine Mechanic
5. Diesel Mechanic
6. Office-Machine Serviceman
7. Maintenance Mechanic
8. Millwright
9. Refrigeration Mechanic
10. Maintenance Man, Factory or Mill
11. Automobile-Service-Station Attendant
12. Stationary Engineer
13. Hydraulic Mechanic

CIS

XIII. Mechanics

1. Automobile Mechanic
2. Truck and Heavy Equipment Mechanics
3. Aircraft Mechanics
4. Small Engine Repairers
5. Service Station Attendants
6. Oilers
7. Millwrights
8. Heat and Cooling System Mechanics
9. Office Machine Repairers
10. Telephone Installers-Repairers
11. Appliance Repairers
12. Jewelers
13. Instrument Repairers

OREGON

XII Marketing

1. Purchasing Agent
2. Account Executive
3. Operations Officer
4. Shipping and Receiving Clerk
5. Stock Clerk
6. Salesman, Insurance
7. Salesman, Real Estate
8. Salesman, Building and Construction Equipment and Supplies
9. Salesman, Automobile
10. Salesman, General
11. Salesperson, General
12. Manager, Department
13. Cashier-Checker

USOE

V. Marketing and Distribution

1. Wholesaler
2. Manager, Sales
3. Salesperson
4. Automobile Salesworker
5. Sales Clerk
6. Salesman, House-to-House
7. International-Trade Economist
8. Buyer, Assistant
9. Purchasing Agent
10. Pawnbroker
11. Insurance Agent And Broker
12. Manufacturer's Representative
13. Automobile Parts Counterman

CIS

XIV. Administrative

1. Hotel and Hotel Managers
2. Education Administrator
3. Business Executives
4. Construction Superintendent
5. Sales and Service
6. Buyers and Purchasing Agents
7. Personnel Managers
8. Public Relations Workers

XV. Sales

1. Insurance Salespeople
2. Real Estate Salespeople
3. Automobile Salespeople
4. Routemen
5. Salespersons
6. Sales Clerks

OREGON

XIII. Metals

1. Foundry Worker, General
2. Machinist
3. Metal Fabricator
4. Sheet-Metal Worker
5. Automobile Body Repairman
6. Welder, Combination

CIS

XVI. Metals

1. Moulders
2. Foundry Workers
3. Tool and Die Makers
4. Machinists
5. Machine Tool Operators
6. Welder
7. Sheet Metal Worker
8. Body and Fender Repairer
9. Blacksmith and Forge Shop Worker

OREGON

XIV. Service

1. Faculty Member
2. Secondary Teacher
3. Elementary Teacher
4. Teacher Aide
5. Legal Assistant
6. Hotel Manager
7. Caseworker
8. Travel Clerk
9. Library Assistant
10. Lodging Facilities Manager
11. Cosmetologist
12. Patrolman
13. Deputy Sheriff

USOE

VI. Public Services

1. Postal Clerk
2. City Manager
3. Commissioner, Public Works
4. Meteorologist
5. Parole Officer
6. Firefighter
7. Sheriff, Deputy
8. Educational Specialist
9. Teacher, Elementary or Secondary
10. University Faculty Member
11. President, Educational Institution
12. Urban Planner
13. Community Organization Worker

CIS

XVII. Social Service

1. Counselor
2. Caseworker
3. Psychologist
4. Social Service Specialist
5. Lawyer
6. Clergy
7. University and College Teachers
8. Elementary and Secondary Teachers
9. Child C[illegible] Worker
10. Recreat[illegible] Program Director

XVIII. Protective Service

1. Law Enforcement Officer
2. Firefighter
3. Military Enlisted Personnel
4. Security Guard

OREGON

XV. Child Care

1. Child Care Attendant

XVI. Clothing

1. Furniture Upholsterer
2. Alternation Tailor
3. Sewing Machine Operator, Regular Equipment

XVII. Drafting

1. Draftsperson

XVIII. Home and Institutional Management

1. Manager, Lodging Facility
2. Maid
3. Janitor

USOE

VII. Natural Resources and Environment

1. Hydrologist
2. Chemist, Inorganic
3. Geologist
4. Mining Engineer
5. Mine Superintendent
6. Forester
7. Tree Planter
8. Forest-fire Fighter
9. Log Scaler
10. Timber Boss
11. Soil Conservationist
12. Fish and Game Warden
13. Sewage Plant Operator

VIII. Communications Media

1. Print Press Operator
2. Lithographer
3. Compositor
4. Bookbinder, Hand
5. Radio Engineer
6. Electrician, Radio
7. Cameraman
8. Air Traffic Controller
9. Sound and Laboratory Engineer
10. Telephone Operator
11. Lineman
12. Communication Engineer

IX. Hospitality and Recreation

1. Guide, Travel
2. Manager, Lodging Facility
3. Travel Clerk
4. Producer
5. Gambling Dealer
6. Superintendent, Circus
7. Director, Recreation
8. Hunting and Fishing Guide
9. Scout, Professional Sports
10. Athletic Coach
11. Instructor, Physical Education
12. Athlete

CIS

XIX. Social Research and Planning

1. Social Scientist
2. Social Program Planner
3. Freelance Writer
4. Writer and Editor

USOE

X. Manufacturing

1. Production Superintendent
2. Industrial Designer
3. Crude Oil Tester
4. Cabinet Maker
5. Butcher, All-Round
6. Sewing-Machine Operator, Regular Equipment
7. Chemical Engineer
8. Clay Modeler
9. Blacksmith
10. Welder, Seam
11. Draftsman, Mechanical
12. Tool and Die Maker
13. Business Machine Serviceman
14. Automobile and Body Repairman
15. Camera Repairman
16. Powerhouse Repairman
17. Sewage-Plant-Attendant

CIS

XX. Textile and Apparel

1. Textile Machine Operator
2. Clothes Designers-Patternmaker
3. Seamstress and Tailor
4. Sewing Machine Operator
5. Laundry and Dry Cleaning Worker
6. Upholsterer
7. Shoe Repairer

USOE

XI. Marine Science

1. Oceanographer, Physical
2. Aquatic Biologist
3. Fish Farmer
4. Fisherman
5. Net Man
6. Shellfish Grower

CIS

XXI. Laboratory

1. Physical Scientist
2. Earth Scientist
3. Soil Scientist
4. Optician
5. Health Technician/ Technologist
6. Laboratory Tester
7. Quality Control Inspector
8. Sanitarian

USOE

XII. Personal Services

1. Man-of-All-Work
2. Manager, Hotel
3. Superintendent, Service
4. Barber
5. Funeral Director
6. Cosmetologist
7. Janitor
8. Manager, Restaurant or Coffee Shop
9. Caterer
10. Baker
11. Bartender
12. Cool
13. Butcher, Meat

USOE

XIII. Transportation

1. Director, Transportation
2. Superintendent, Airport
3. Traffic Inspector
4. Dispatcher
5. Truck Driver
6. Ticket Agent
7. Chauffeur
8. Locomotive Engineer
9. Captain, Vessel
10. Seaman
11. Pilot
12. Automobile Mechanic

CIS

XXII. Transportation

1. Air Traffic Controller
2. Railroad Conductor
3. Bus and Taxi Driver
4. Truck Driver
5. Bulldozer Operator
6. Operating Engineer
7. Yarding and Loading Occupations
8. Forklift Operator
9. Railroad Engineer
10. Railroad Brakeman and Switchman
11. Ship Officer and Engineer
12. Pilot and Flight Engineer

USOE

XIV. Consumer and Homemaking

1. Home Economist
2. Social Worker
3. Child-Care Attendant
4. Dietitian
5. Interior Decorator
6. Manager, Boarding House
7. Chemist, Textile
8. Model
9. Dressmaker
10. Home Economist, Consumer Service
11. Teacher, Home Economics
12. Supervisor, Education (Supervisor, Home Economics)

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USOE

XV. Fine Arts and Humanities

1. Newspaper Reporter
2. Teacher, Speech
3. Dancer
4. Singer
5. Radio and TV Announcer
6. Economist
7. Historian
8. Director, Art
9. Illustrator
10. Book Critic
11. Anthropologist
12. Librarian

CIS

XXIV. Other Production Occupations

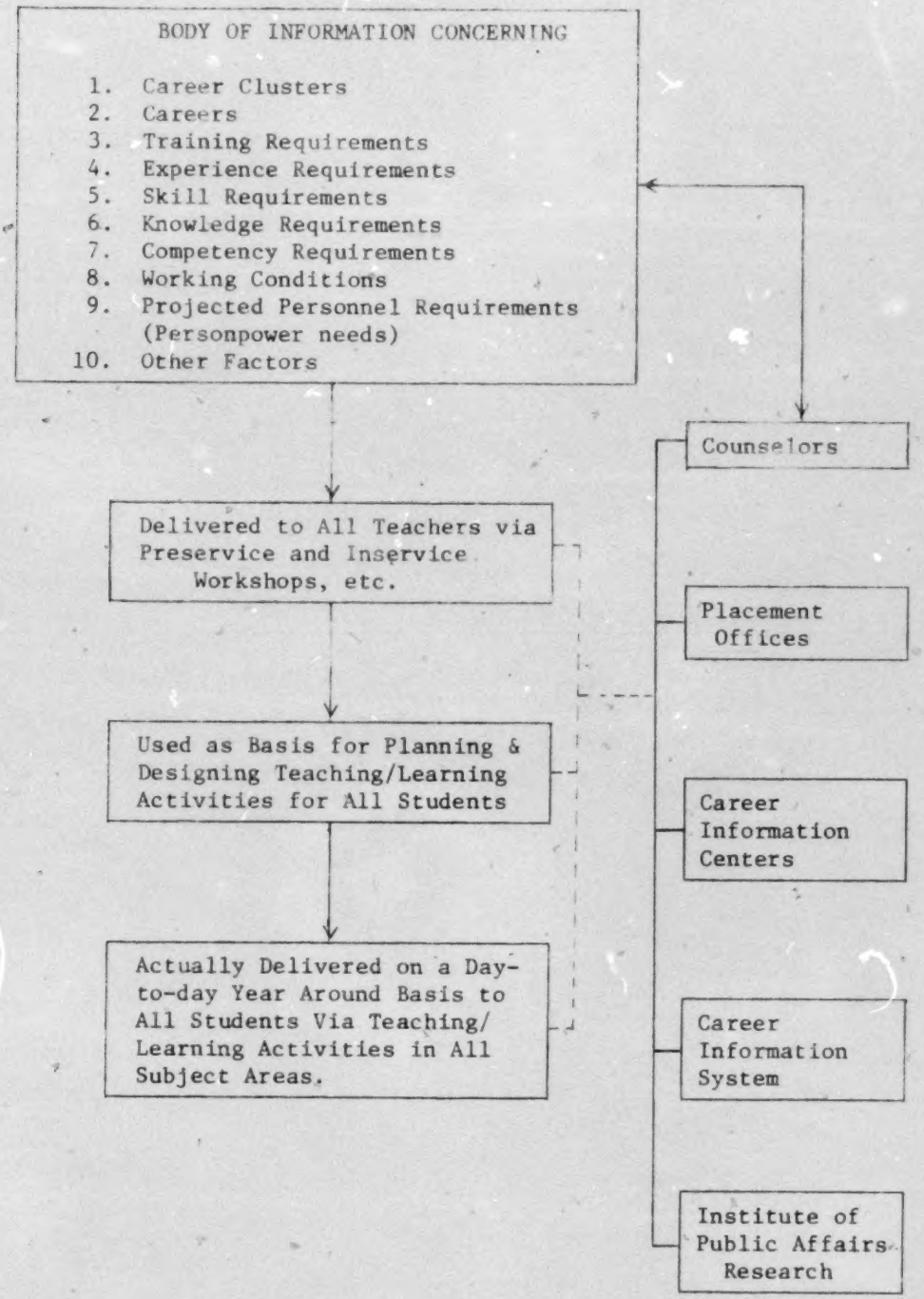
1. Petroleum Processing
2. Rubber and Chemical Processing
3. Rubber and Plastic Fabricators
4. Production Painters Finishers
5. Boiler Operator
6. Sewage Plant Operator
7. Production Assembler
8. Handcrafter

XXV. Stock Control Occupations

1. Car Loader
2. Warehouseman
3. Shipping and Receiving Clerk
4. Stock Clerk
5. Mail Carrier
6. Newspaper Carrier
7. Packers and Wrappers
8. Grocery Bagger
9. Librarian
10. Library Assistant

APPENDIX III

Suggested Channels for Delivering Career Information


BODY OF INFORMATION CONCERNING
1. Career Clusters
2. Careers
3. Training Requirements
4. Experience Requirements
5. Skill Requirements
6. Knowledge Requirements
7. Competency Requirements
8. Working Conditions
9. Projected Personnel Requirements (Personpower needs)
10. Other Factors
Delivered to All Teachers via Preservice and Inservice Workshops, etc.
Used as Basis for Planning & Designing Teaching/Learning Activities for All Students
Actually Delivered on a Day-to-day Year Around Basis to All Students Via Teaching/Learning Activities in All Subject Areas.
Counselors
Placement Offices
Career Information Centers
Career Information System
Institute of Public Affairs Research